Final report

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SITE SELECTION PROCESS

PHASE 3B: SELECTION OF CANDIDATE SITES

Urbanization

ECOLOGISTICS LIMITED

OCTOBER 31, 1984

ecologistics limited CONSULTANTS IN ENVIRONMENTAL RESOURCE MANAGEMENT

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October 31, 1984

Dr. B.D. Mitchell
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Dear Sir:

Re: Final Report: "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Urbanization"

We are pleased to forward herewith our final report for the above-noted study. Maps which accompany this report are found in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

This report documents the analysis which led to the mapping of urban shadow areas within the Ontario Waste Management Corporation candidate areas.

The results of this work were incorporated into our broader agricultural assessment which appears in our technical report, "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Agriculture."

We are pleased to have been of service.

Yours very truly,

ECOLOGISTICS LIMITED

DR Cressman

D.R. Cressman, M.Sc., P.Ag.
President

DRC/vw

Enclosure

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EXECUTIVE SUMMARY

PURPOSE OF THE REPORT

This report documents in detail the development of the urban shadow factor that was employed in Chapter 2 of the report, "Site Selection Process - Phase 3B: Selection of Candidate Sites - Agriculture." It presents a review of the literature on urbanization of rural areas and documents discussions with recognized experts in this field about methodologies for delineating urban shadow areas. The range of potential indicators available in existing data bases is evaluated and the basis for selecting and integrating three of these is presented. The report concludes with an application of the selected indicators to the Ontario Waste Management Corporation (OWMC) Candidate Areas.

SCOPE AND METHODS

An area defined as "urban shadow" was recognized as the zone of urban influence that the study sought to identify. Within this zone, the processes of urbanization have in the past and/or currently are undermining agricultural resources to the extent that the long-term viability of agriculture is in doubt.

The approach adopted was based on the selection and measurement of a small number of key variables as surrogates for urban pressure. Selection of the variables and an appropriate analytical methodology were the major conceptual problems of the study. Choice of variables was also limited by data constraints and the need to find the lowest level of data aggregation with comprehensive coverage for all OWMC Candidate Areas. Census data for 1981 at the enumeration area (E.A.) level were the main data source used. The selection of variables and method of analysis was supported by two important steps:

- literature review,
- consultation with recognized experts.

A literature review provided information on variables and methodologies used in previous research. Though there is considerable documentation on the subject of urbanization, little empirical work has been undertaken to measure the impact of urban pressure on agricultural resources and no predictive models were readily available for use in this study. The only comparable attempts at delineating zones of urbanization within broad geographic areas for site selection purposes have been carried out by Ontario Hydro.

Examination of 20 variables suggested in the literature, coupled with data constraints, led to the selection of three variables as potential indicators of urban shadow. An analytical framework was conceptualized based on a combination of high, medium and low rankings of each of the

three proposed variables. This methodological approach has not been previously utilized, consequently there were no established guidelines to demarcate cutoff points for each variable. The rationale for the proportional values adopted in each cutoff was based on professional judgement and test mapping rather than on any statistical procedure.

The second step involved consultation with a number of recognized experts in the field of urbanization on the appropriateness of selected indicators and the suggested analytical approach. The meetings resulted in:

- refinements to the three indicators;
- reconsideration and testing of additional indicators—all of which were subsequently rejected for use;
- general acceptance of the proposed method of analysis.

Following the data analysis, an additional aspect of the study methodology involved the verification of the identified urban shadow E.A.'s through examination of other selected agricultural census data and regional literature (Appendix H). Local plans and by-laws were also reviewed to determine local authority support for protecting and enhancing agricultural lands and the agricultural industry.

PREMISES AND POSTULATES

PREMISES

Candidate area boundaries as established in the OWMC Interim Phase 3 Report formed the basis for determining which E.A.'s were examined. All E.A.'s within the candidate area boundaries or containing a fraction of the land designated within each candidate area were included in the analysis. The data base used to delineate urban shadow E.A.'s had to be uniform in content and level of detail across the candidate areas. As directed by OWMC, experts in the study of urbanization were to be consulted to test out and improve upon this work because of its original nature.

POSTULATES

The study approach assumes that it is possible by means of a small number of variables to identify urban shadow areas.

It is also assumed that the E.A. level of detail is sufficient for assessing potential candidate site areas. It is recognized, however, that the comparison of candidate sites will require more detailed data and that additional variables relevant to the processes of urbanization may be available at the site specific level of analysis.

STATUS OF THE DATA

Data for the selected indicators used in the survey were taken from the 1981 Agricultural Census and the 1981 Population Census of Statistics Canada. The E.A. census subdivision - the lowest level of comprehensive aggregate data for all OWMC Candidate Areas - was selected as the unit of analysis for the survey. While it is recognized that the procedure for the recording of census farm data introduces minor discrepancies in the area figures for each E.A., the proportional values used in the analysis were deemed sufficiently accurate for the purposes of the analysis.

Secondary source data served two functions. First, a literature review provided information on the nature and use of variables used in related studies. From this review a list of 20 major variables was compiled for examination.

Second, additional material was used to corroborate the selection of the 12 urban shadow E.A.'s.

- Census of Agriculture data 1961-1981: A group of selected variables were studied over the 20-year period to derive a basic overview of agricultural change. Data were not, however, available at the E.A. level throughout this period, therefore the material was not used earlier in this analysis. Township, county and regional level trends provided some support for the selection of the urban shadow E.A.'s.

- Regional literature provided additional descriptive information on aspects of agricultural land use and change. Coverage was neither complete nor of a similar nature for all candidate areas. There was, however, sufficient detail to provide evidence of agricultural change, and insight on the degree of protection for agriculture.

- Air photographs provided useful information on general settlement patterns in rural areas.

- Local municipal plans and by-laws were studied to ascertain land use policies vis-a-vis rural and agricultural land and the level of protection accorded to agriculture. The degree of protection identified (low, moderate, high) is only in relation to other plans and policies within the candidate areas.

MAIN FINDINGS

The indicators selected for delineating urban shadow areas were:

- percent of E.A. improved farmland that is rented;
- percent of E.A. that is not farmed;
- percent of E.A. population that is classified as rural non-farm.

The three indicators were evaluated based on the range and distribution of values recorded throughout OWMC Candidate Areas and comparison with provincial and candidate area averages. Also, the data were mapped for each of the indicators. This permitted an appraisal of the geographic distribution of the data for each variable and assisted in the choice of cutoff points in the grouping of the data into high, medium and low levels. When the ranking system was developed, it was also applied to a map of the candidate areas and the distribution of candidate urban shadow E.A.'s was evaluated.

A total of 14 E.A.'s emerged from the analysis as candidate urban shadow areas. Of this group, 9 were ranked as first order E.A.'s, having high values for all three variables. Five were ranked as second order E.A.'s, having a high value for two of the three indicators and a medium value for percent E.A. not farmed. Two of the 14 candidate urban shadow E.A.'s were subsequently removed from the list following examination of land use patterns on air photographs.

The findings are based on the conceptual framework of a ranking of three selected variables. No appropriate model was found from previous research. Consequently, the method of analysis applied in the survey was devised specifically for use in this study. While there can be continuous debate as to the precise cutoff points adopted, no superior alternative was suggested by the experts and no previous research appears to have devised a more appropriate methodology. For the purpose of identifying relative differences between E.A.'s, the working assumptions made during the analysis are therefore considered appropriate.

CONCLUSIONS AND RECOMMENDATIONS

Twelve E.A.'s within OWMC Candidate Areas are identified as urban shadow E.A.'s. The 12 comprise those E.A.'s most affected by urban pressure within the entire OWMC Candidate Area boundaries. This does not, however, imply that agriculture in other E.A.'s is unaffected by urban pressures. The analysis has provided only a relative indication—a ranking of relative differences between candidate area E.A.'s.

Results of the analysis lead to the following conclusions:

- Potential locations for OWMC waste disposal sites which fall within the boundaries of the 12 E.A.'s identified as urban shadow should be retained for further study, regardless of the present agricultural use and soil capability rating. With field analysis at the site level and with more specific data on such factors as land ownership and land values, these candidate sites can be examined and assessed in detail.

- The 79 E.A.'s outside the ranking of first or second order urban shadow should, if possible, be given lower priority for candidate site selection than the 12 urban shadow E.A.'s on the basis that agriculture in these E.A.'s would be affected more by the introduction of OWMC facilities than would the urban shadow E.A.'s.

CHAPTER 1

INTRODUCTION

Examination of agricultural resources within OWMC Candidate Areas shows that much of the rural area has been and/or is being altered through the forces of urbanization. To the extent that productive agricultural land in rural areas may need to be considered for the siting of OWMC facilities, greater justification can be made for using land that already exhibits signs of urbanization rather than using land in more stable agricultural areas.

The potential impact of siting an OWMC facility in an area already undergoing urban-related change will be additive and will not be as intrusive as a siting in a stable agricultural area. This view has also been expressed by representatives of provincial agricultural organizations and at OWMC public workshops. Therefore, in accordance with a principal site selection objective "to minimize the impact on agricultural resources," higher priority in the selection of candidate sites, where possible, should be given to those areas where the stability and long-term future of agriculture has been seriously eroded by forces of urbanization.

OBJECTIVES

Given the above guidelines, the objectives of this report are as follows:

1. to identify indicators of the relative degree to which the agricultural land base and the agricultural community have been detrimentally affected by urban pressures;

2. to discuss the selected indicators with recognized experts in the field of urbanization and to seek their opinions on the suggested techniques for data analysis;

3. to identify within OWMC Candidate Areas those zones within which urban pressures have sufficiently altered the agricultural land base and the agricultural community as to de-stabilize the agricultural sector and to place its long-term future in doubt; and

4. to document the results of the analysis.

METHODOLOGY AND REPORT FORMAT

An extensive literature search was undertaken to identify indicators that have been used to measure urban pressure on rural and agricultural areas. Findings from this search are discussed in Chapter 2.

Indicators, identified from the literature, were reviewed on the basis of their relevancy for the current study. Problems and constraints of data availability were also examined. Potential indicators and the rationale for their use were discussed with a number of experts in the field of urbanization before a final selection was made. The indicator selection process is described in Chapter 3.

Three key indicators were selected as a basis of identifying areas affected by urban pressure. Cutoffs were determined for these indicators reflecting high, medium or low urban pressure. The data were analyzed and mapped on the basis of established cutoffs and a list of areas showing high levels of urban pressure was compiled. The analysis of key indicators and the identification of areas are described in Chapter 4.

Background knowledge of OWMC Candidate Areas gained from secondary data were used to corroborate the identification of urban pressure areas. This additional input is contained in Appendix H.

Chapter 5 summarizes the findings, puts forward conclusions regarding urban pressures in OWMC Candidate Areas and recommends specific areas that should receive higher priority in the selection of candidate sites.

CHAPTER 2

LITERATURE REVIEW

SUMMARY

This section reviews recent literature concerning the broad subject of urbanization of rural areas. A brief description of the nature of published sources is followed by a discussion of definitions and the selection of a definitional construct for use in the report. Major approaches and methodologies are then examined. Common parameters used in the measurement and evaluation of urban pressures are identified and a list of potential indicators is compiled for the analysis of urban pressures in OWMC Candidate Areas.

INTRODUCTION

There is an extensive body of literature on the subject of urbanization and on rural and agricultural resources in urbanizing environments (Appendix A). Many researchers, principally geographers, agricultural economists and sociologists, have identified and discussed the

characteristic changes in rural areas associated with urban encroachment. However, only since the 1970's have there been attempts to develop a conceptual framework for measuring the 'impacts' of urbanization and, to date, few studies have provided empirical evidence of the impact of urban development on agricultural areas.

DEFINITIONS

Numerous studies have described definitional notions of the areal extent of urban growth (Gertler and Hind-Smith, 1962; Pryor, 1968; Russwurm, 1975; Bryant, 1982). Such concepts have given rise to a lengthy list of terms to describe areas beyond the urban core: fringe area, urban fringe, rural-urban fringe, urban-fringe, country-city fringe, commuting zone, suburban zone, peri-urban area, urban sprawl and urban shadow. Many definitions are interchangeable while others are viewed as forming a spatial continuum from purely urban to purely rural. For example, Russwurm (1973) divides the area surrounding the urban core into an inner and outer fringe that merges into urban shadow which extends to the rural hinterland. Urban pressures affect each zone in different ways and it has been generally concluded that the intensity of most urban-related intrusions into rural areas decrease with increasing distance from the urban core.

Direct impacts of urbanization, such as the conversion of agricultural land to non-farm use, have been particularly aligned with the notion of "urban fringe," whereas land areas indirectly affected by urban pressures have been designated as urban shadow. The term "urban shadow," first used by Gertler and Hind-Smith (1962), to imply countryside subject to pressure for removal from agricultural use, has been variously defined as:

- "a landscape where the first noticeable signs of urban invasion of rural land is occurring" (Russwurm, 1973, p. 4);
- "sterilized farmland or land under pressure to move out of agricultural production such that the 'unseen' influence of the city appears more important than the tangible evidence of land use for planning" (Bryant, 1973, p. 93).

In this report it is the identification of so-called urban shadow areas that is of concern; in the context of candidate areas being that land considered under pressure to move out of agricultural production.

Throughout the literature, there is a tendency to regard impacts of urban pressure on agriculture as negative. However, it should be borne in mind that there can be benefits to the agricultural community from proximity to urban development. Among such benefits are: access to markets, access to a wider range of employment opportunities and, in some situations, the increased availability of cheap rental land.

Generally, urban pressure on agriculture has a negative connotation and is perceived as being a threat to productive agricultural resources implying a loss of agricultural efficiency and productivity, growing

conflicts between farm and non-farm populations, escalating land values, increased land speculation and land fragmentation, changes in the ownership of farmland and uncertainty for the future. Though such views of urban pressure are widely held there has been little empirical evidence to support many of these negative factors. It is also evident that not all 'pressures' can be quantified and objectively measured. One of the commonly acknowledged consequences of urban pressure is 'uncertainty'--a lack of confidence in the future outlook for farming and community stability in an area. While many researchers have recognized this factor, there has been little attempt to document or measure such an intangible reaction.

APPROACHES, METHODOLOGIES, INDICATORS

The range of studies concerning rural-urban issues is vast. An arbitrary division can be made between those that focus on agricultural issues and predominantly utilize agricultural data and those that are principally concerned with population and residential growth in rural areas and have utilized population data. All studies do not fall neatly within this dual categorization, but such a division facilitates a discussion of study methodologies and indicators.

AGRICULTURALLY-ORIENTED STUDIES/AGRICULTURAL DATA

The broad issue of urban influence on agricultural land has been the subject of considerable research in Canada (Gertler and Hind-Smith, 1962; Gottman, 1971; Pearson, 1972; Morse, 1976; Mackrandilal, 1978; Thompson, 1981; Warren et al, 1981) and in the United States and England (Schmid, 1968; Conklin, 1972; Munton, 1974; Hart, 1976; Vinning et al, 1977). In the context of Southern Ontario substantial work on the subject has been generated at the University of Waterloo (Russwurm, 1967, 1970; Howard, 1972; Martin, 1975, 1976, 1977; Fielding, 1979; Bryant and Fielding, 1980; Hyslop and Russwurm, 1981).

A major study theme has been the encroachment of urban development onto agricultural land and farmland loss (Crerar, 1963; Patterson, 1968). Attempts have been made to measure the amount of agricultural land conversion though research has been thwarted by problems of data availability. Use of empirical data has been sporadic and the majority of studies have tended to employ agricultural census data, recording loss of land from census farms as a surrogate to infer urban development or competition for alternative land uses. However, it is frequently emphasized that loss of farmland does not necessarily imply conversion to urban use. Research by Bryant (1976) and Bryant and Greaves (1978) in Canadian metropolitan regions showed that greatest agricultural land losses were found in areas where urban growth (measured as percent population change) was small--the land removed from farming in these

instances being uncompetitive for agricultural production. Other studies that have attempted to measure urban growth have utilized population data (see p. 14).

Changes in agricultural land use, land values, land tenure and ownership, agricultural productivity and farm efficiency have been posed and discussed as consequences of urban pressure (Brown, 1971; Fielding, 1979; Bryant and Fielding, 1980). Numerous indicators have been used to account for changes in productivity and farm efficiency, but as yet little empirical analysis has been undertaken. Phillips (1981) hypothesized that farming practices and agricultural productivity were adversely affected by proximity to an urban area. He undertook a questionnaire survey of farms in the Regional Municipality of Haldimand and examined such variables as land tenure, off-farm employment (part-time farming), age of operator, crop patterns and yields and capital investment in buildings and drainage. The list of variables examined by Phillips is fairly consistent with other studies that have analyzed some aspect of urban pressure impact on agricultural resources (Centre for Resources Development, 1972; Mackrandilal, 1978). Martin, in his analysis of the impact of urbanization on urban-fringe farming, used the following nine variables:

- number and size of farms
- farm tenure
- age of operator
- improved and unimproved farmland
- livestock units maintained

- off-farm employment
- farm labour
- farm investment
- value of production

It should be noted that Martin used data from the 1961, 1966 and 1971 census for time-series analysis and compared area trends with figures for the Province of Ontario. He also observed that, "it proved impossible to analyze agricultural variables by E.A. [enumeration area] over time" (Martin, 1975, p. 37) and in his study aggregated E.A.'s to avoid problems of boundary changes and increased numbers of E.A.'s from census to census.

Changes in land ownership, land values and farmland tenure have been widely discussed and utilized as indicators of urban influence (Clawson, 1962; Ferguson, 1975; Martin, 1975, 1976, 1977; Fielding, 1979; Bryant and Fielding, 1980; Bryant, 1982). It is put forward that land speculation and an active real estate market, in anticipation of urban development, can lead to increased land values and an inflation of land price beyond its value for agriculture. While local farmers may benefit by a short-term increase in land available for rent from non-farming landowners, the insecurity of the long-term use of the land can detract from farm investment and, hence, efficiency and productivity. The three variables of ownership, land value and tenure (land rental) are, thus, widely used as indicators of urbanizing forces.

The use of a wide range of statistical measures of non-farm land ownership were important variables in Russwurm's analysis of urban fringe and urban shadow in the Toronto to Stratford urban corridor system (1970). While most of the data were extracted from assessment rolls, certain non-farm ownership data are in published form in the agricultural census. As stated by Russwurm, "This relative measure [non-farm land holding ownership]...is one of the most important variables for measuring the expansion of urbanization across land space" (Russwurm, 1970, p. 31).

Few studies have attempted categorically to identify agricultural areas subject to urban pressure. Ontario Hydro (1979) endeavoured to measure the strength of local agricultural communities based on analysis of a small number of selected indicators. The Hydro study is analogous to the present study and, as such, was carefully examined for the process and rationale in the selection of variables. The E.A. was used as the unit of analysis and a large number of possible indicators from the 1971 Census of Agriculture were mapped and reviewed with farm representatives. The key indicators finally selected by Hydro were:

- percent of E.A. farmed;
- percent of E.A. owned and farmed by the operator;
- farm population as a percent of total population.

These indicators were weighted and the combined score for each E.A. provided an index of agricultural-community strength. Details are discussed later in this report (p. 31).

POPULATION AND RELATED STUDIES/POPULATION DATA

In the measurement of urban development or in the concomitant loss of agricultural land the inferential use of population data has been widely adopted as a parameter, whether measured as percent change or as density per unit area. A study undertaken by the Community Planning Branch of the Department of Municipal Affairs in 1960 indicated an exponential relationship between the area developed for urban purposes and population numbers (Department of Municipal Affairs, 1960).

On a national scale Gierman (1977) took the average annual rate per 1,000 change in population, population density and changes in land use function in an attempt to measure the land capability classes lost directly to urbanization.

Krueger (1959, 1978, 1979) has undertaken extensive longitudinal studies of land use changes and urbanization in the Niagara Fruit Belt. As part of the analysis of degree of urbanization Krueger adopted the four-part classification of population density developed by Russwurm (1970): urban, semi-urban, semi-rural and rural. While Russwurm used spatial units of from 6 to 8 square miles, Krueger used much smaller township concession blocks as mapping units even though such areas were not of equal size. Slightly different thresholds of density values were also adopted in Krueger's analysis to account for the smaller scale of farm operations in the Niagara Fruit Belt. Yeates (1975) similarly employed Russwurm's density classification in his analysis of the urban

corridor from Windsor to Quebec City, but used census subdivisions as mapping units. Both Russwurm and Yeates analyzed population data for density values whereas Krueger used air photos and field analysis to determine numbers of homesteads and farmsteads in the study area and calculated density values on a residence basis.

As a more discriminating variable than total population, a number of studies have taken the relative proportions of farm and non-farm populations present in rural areas as an indicator either of urban pressure or its corollary, agricultural stability. For example, farm population as a percent of total population was the major parameter used by Ontario Hydro (1979), receiving a weighting of 50 percent of the total index value. Russwurm has suggested that "urban fringe areas have over 50 percent of their non-nodal population classified as non-farm" (1970, p. 17).

Conversion of agricultural land areas to urban use has been studied in Alberta (1976) through the planning process by analysis of subdivisions and severances granted by municipal authorities. Employing similar data, Smit et al (1979) have examined the process of rural residential development in a Southern Ontario township. The spread of low density residential development in rural areas has received considerable attention and includes research by Found and Michie (1976) on rural estate development, by Amos (1979), McRae (1981), Punter (1974), Brown (1977) and Whitehead (1968) on the subject of 'ex-urban' development and that by

Van Vuuren on housing development and farm property taxation. In the measurement of urban pressures, such studies provide confirmation of the need to examine some aspect of non-farm population intrusion into rural areas whether directly by means of population statistics or indirectly through examination of housing development.

LITERATURE REVIEW - CONCLUSIONS

Areas defined as urban shadow—land considered under pressure to move out of agricultural production—are not part of a finite and static phenomenon but are integral to a dynamic process of change. The concept of urban shadow, therefore, cannot be quantified in absolute terms. Inferential parameters of the process can be objectively selected, theoretically evaluated and measured, but there will always remain an element of subjectivity in an analysis of this nature.

Numerous variables have been noted from the literature and some of the major ones have been briefly discussed. The following were the most recurring variables used in analyses to date:

Agricultural variables:

1 - land area farmed
2 - farm size
3 - farmland ownership/rental
4 - land use data
5 - livestock units
6 - land value
7 - capital value of farmland and buildings
8 - land fragmentation (severances/subdivisions)
9 - property taxation
10 - age of farm operator
11 - part-time farming
12 - non-resident farm operators
13 - hired labour

Population and related variables:

14 - population density
15 - population growth
16 - rural farm and rural non-farm population
17 - housing data—non-farm residential development
18 - number of commuters

Other variables:

19 - legislation/municipal plans and by-laws
20 - conflicts and incompatibilities

These 20 variables comprise the base list from which key indicators are selected for consideration in the urban shadow analysis of OWMC Candidate Areas (see p. 19 and Appendix C).

CHAPTER 3

SELECTION OF INDICATORS

SUMMARY

Variables noted from previous research were assessed for use in the identification of urban shadow areas in OWMC Candidate Areas. Data sources and constraints were considered and the E.A. chosen as the unit of analysis. An initial selection of three indicators formed a basis for discussion with recognized experts. Based on input from the experts, refinements were made in the choice of indicators and the method of analysis.

DATA SOURCES

Given the range of variables a variety of data sources was examined for possible use. Quantifiable, reliable and comprehensive data were a requisite. As such, data readily available from the census were favoured. The 1981 Agricultural Census and 1981 Population Census were key sources. Problems of data availability, assembly and time constraints

obviated the use of a number of alternative sources; assessment roll data and other municipal records of subdivisions and severances were rejected principally on this basis. Data from Ontario Hydro customer listings, a valuable source used in previous analyses of residential composition in rural areas, have not been accessible in recent years. For other variables data were not available at a unit of analysis small enough to differentiate zones within OWMC Candidate Areas. Such was the case with O.M.A.F. rural real estate prices and other real estate data. Air photos were examined for potential use as a data base for the number of rural residences, but were considered of greater value as support rather than primary data.

UNIT OF ANALYSIS

E.A.'s were selected as the unit of analysis (see Appendix I). E.A.'s are the smallest census subdivision for which comparable data can be obtained. Special computer runs from Statistics Canada were required, however, as census data are not published at the individual E.A. level. It was also necessary to aggregate a number of E.A.'s in order to obtain data as information for E.A.'s containing fewer than 10 census farms is generally not available to the public to prevent disclosure of confidential material. In total, 91 E.A.'s and aggregated E.A. units were used in the analysis (see Appendix B for the list of candidate area E.A.'s).

Because of the problems of boundary changes, the continual creation of new E.A.'s from census to census, and the fact that some data are not available at the E.A. level prior to 1976, trend analysis of variables was not possible and data from only the 1981 census were utilized.

INITIAL ASSESSMENT OF THE VARIABLES

Each of the 20 variables listed on page 17 was examined to assess its value as an indicator of urban shadow within the context of OWMC Candidate Areas. Variables that were considered in the initial selection process are listed in Appendix C along with notes of their potential use and rationale for acceptance or rejection.

Three variables were chosen as potential key indicators of urban pressure on agricultural resources:

- percent of E.A. farmland that is rented;
- percent of E.A. classified as farmland;
- percent of E.A. rural population that is classified as rural non-farm.

The rationale for selection of these three variables is as follows.

Percent of E.A. farmland rented

- Farmland ownership by non-farmers, or its corollary land rental, is the most frequently used variable by researchers to indicate urban influence in research to date.

- Farmland ownership by non-farmers/or land rental represents a loss of control over the land resource and a loss of decision making in the long-term use of land by the farm community. Some renting between farmers does occur, especially from father to son, but evidence from secondary data concerning parts of the candidate areas (Mississauga) indicates that farm land ownership by non-farmers predominates), (Centre for Resources Development, 1977).

- Land rental can lead to a loss of stability, greater uncertainty and insecurity for farmers. Since leases are typically short, long-term planning for farm investment is frustrated. Rental also has been associated with abuse and mismanagement of the land, although such allegations have not been explicitly proven.

Percent of E.A. farmed

- Reflects land utilization within an E.A.

- E.A.'s with much of their historic farmland base no longer in active agricultural use experience a decline in agricultural outputs relative to the land potential.

Percent of rural non-farm population

- Considered to be a good indicator of urban pressure in the literature.

- A high proportion of rural non-farm residents is indicative of the competition for land resources and increasing urbanization.

- A high proportion of rural non-farm residents implies less `political voice´ for the farm population with a potential negative effect on the long-term stability of the agricultural community.

Using these three indicators the following calculations were made for each of the 91 E.A.´s with data from the 1981 Agricultural Census and the 1981 Population Census:

- percent of E.A. farmland rented = area of rented land as a proportion of total farmland area;
- percent of E.A. farmed = area of farmland as a proportion of total E.A. land area;
- percent of rural non-farm population = rural non-farm population as a proportion of total rural population.

It was postulated that E.A.´s with a high rental, high non-farm land use and high rural non-farm population could be defined as urban shadow E.A.´s, and these high proportions would be logically oriented to major urban centres. This hypothesis was checked by plotting the values on maps. The distribution of values was determined to be consistent with this hypothesis.

Each proportional value was also plotted on a histogram to examine the ranges and distribution over the study area (Appendix D). High, medium and low categories were tentatively demarcated, based on the distribution of recorded values.

INPUT FROM RECOGNIZED EXPERTS

The three selected indicators and the proposed method of analysis were discussed at the series of meetings with recognized experts in the study of urbanization of rural areas (see Appendix E for the list of experts consulted). The cumulative outcome of the consultations resulted in:

- confirmation of the value of the three indicators with refinements of the measurements to be used;
- reconsideration and testing of other variables;
- suggestions for other methods of analysis, though overall support for the proposed methodology.

REFINEMENTS TO THE THREE INDICATORS

Percent of farmland rented

- This variable was considered a good indicator.

- It was suggested by two experts that percent of improved farmland rented would be a more accurate reflection of the non-farmer ownership of productive agricultural resources.

The area of rented land as a proportion of improved farmland for each E.A. was calculated (see Appendix G) and compared with the original indicator. In all cases, the values were marginally higher but essentially gave a mirror image of the original distribution.

It was decided to adopt the improved area calculation as a more appropriate indicator of productive farmland rented.

- Values for each E.A. were calculated according to the following:

$$\text{percent of E.A. improved farmland rented} = \frac{\text{area of rented land}}{\text{area of improved farmland}}$$

The new values were mapped (Map E.U1) and the distribution inspected in detail. This map is included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

- It was brought to our attention that land rental is a measure of ownership by non-farmers, but also can reflect rental between farmers. However, it is not possible to distinguish between farm and non-farm ownerships in the census data. It was also observed that the proportion of rental land has greatly increased throughout the Province of Ontario in recent years. Both points, however, do not change from the fact that the ultimate control of land resource is out of the hands of the farm operator in the case of rented land.

Percent of E.A. farmed

- This was also considered an important indictor and one that should be retained. It has been used in numerous studies.

- Concern was expressed over the figures for total E.A. land area and how they were calculated. Mention was also made that in some cases land that is farmed may not be recorded by the census. It was pointed out that a census farm is recorded as a total unit within the municipality which contains the principal headquarters, irrespective of the fact that part of the land area may lie within another municipality. Hence, E.A. figures of census farm area can somewhat misrepresent the true area farmed within the boundary. It was agreed, however, that this is the most appropirate data base for the study, provided that this limitaiton was acknowledged in the study.

- It was suggested that data could be compared to the provincial average or to the average of a zone comprising areas south of the Canadian Shield, in order to provide a more theoretical basis for establishing cutoff values. Assessments based on averages were rejected as they can readily disguise anomolies.

- As an alternative measure, it was suggested that a land-use combination analysis could be made if other land-use areas were known. This would provide a better indication of the importance of farming in an E.A. Such data, however, were not available at the E.A. level.

. As with the rented land indicator, it was suggested that improved farmland area rather than total be used to calculate proportion of E.A. farmed. It was stated that total farmland area has consistently decreased in Ontario for many decades, though part of this loss has been in unimproved area. In stable and good agricultural areas improved farmland has remained a high proportion of total farmland. It was felt, however, that for the present study, total farmland remains a better indicator of overall farm land use and of the strength of farming, actual and potential, within an E.A.

In order to be consistent with other measures of the degree of urban pressure, it was decided that this indicator would be presented as the proportion of the E.A. in non-farm use. That is, the greater the proportion of non-farm land uses, the greater the 'urban pressure.'

Calculations were made according to the following:

$$\text{percent of E.A. not farmed} = \frac{\text{area of land not farmed}}{\text{total E.A. land area}}$$

As with other indicators, the proportional values were plotted on a histogram (Appendix D) and mapped (Map E.U2). This map is included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

Percent of rural non-farm population

. Though this indicator has been used extensively in previous research, there was concern over its value in the present study. It was

generally agreed, however, that a measure of population is one of the most important indicators of urbanization.

On the basis of research by Russwurm (1970) when non-farm population exceeds farm population the area can be considered under urban pressure—this would apply, however, to 89 of the 91 candidate area E.A.'s. In fact, most of the experts stated that proximity of all E.A.'s within candidate areas to large urban centres accounts for the generally high level of non-farm population.

- Concern was also expressed by experts over the need to distinguish between nodal and scattered rural non-farm population. A scattered non-farm population has greater physical impact on agricultural resources than a clustered settlement of non-farm residences. In terms of `political voice,' however, it is numbers rather than location of population that is important. Both impacts were taken into consideration in the analysis.

- After consideration of alternative variables (see: population density, p. 27) it was decided to retain rural non-farm population as an indicator. It was further decided, however, that once the identification of urban shadow E.A.'s was made (based on the accumulated indicator rankings), air photos would be used to determine which of the E.A.'s contain predominantly clustered or scattered non-farm populations.

. The calculation for this variable remained the same as:

$$\text{percent of rural non-farm population} = \frac{\text{rural non-farm population}}{\text{total rural population}}$$

The values are plotted on Map E.U3. This map is included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio."

RECONSIDERATION AND TESTING OF ADDITIONAL VARIABLES

During consultation with the experts other variables were discussed. Based on knowledge of data availability and familiarity with the agricultural land use in OWMC Candidate Areas, it was possible to eliminate a number of the suggested variables as being inappropriate in the present study context. However, certain variables were consistently suggested as potential indicators and were therefore re-examined:

. population density
. livestock units
. age of farm operator
. off-farm work

Population density

This was discussed by all experts as a possible alternative indicator to rural non-farm population. Russwurm, Yeates and Krueger have all used a density measure as an indicator of urbanization (see p. 13-15).

Density values were, therefore, calculated for each E.A. on the following basis:

- rural population density (total rural population divided by total E.A. land area);
- rural non-farm population density (rural non-farm population divided by total E.A. land area).

The calculated values (see Appendix F) did not provide any clear pattern when mapped. Previous studies have assessed density on the basis of equal or near equal-sized areas whereas the range of E.A. sizes and the variety of land uses other than agricultural or residential appear to sufficiently distort density values as to question the validity of their use in this context. The density indicator was consequently rejected.

Livestock units

It was suggested by one of the experts that a calculation of livestock units (all livestock including poultry and pigs) be used as an indicator on the rationale that livestock enterprises tend to decline in urban fringe areas. However, this variable was subsequently rejected on the following basis:

- while research has shown that certain enterprises, especially dairy, tend to decline, others, particularly poultry and pig operations, have been observed to intensify in certain urban fringe areas;
- low livestock units could also be found in areas where land is of greater value for specialty crops and would not necessarily be indicative of urban pressure;
- it was noted in discussion with another expert that livestock units recorded in the census were an inventory of one point in time and on this basis would not be an accurate indicator of intensity of livestock operations year round;
- unit sales of livestock could not be used as an alternative to head of livestock as data were not collected in the 1981 census.

Age of farm operator

A relatively high proportion of older farm operators can be indicative of agricultural instability and lack of farm turnover. High average age is considered as symptomatic of pressures that discourage young entrants, can imply high land costs and a lack of perceived opportunities in agriculture which are also associated with areas undergoing urban pressure. Earlier census surveys reported the actual age of farm operators and based on such data, this variable has been used as an indicator of urbanization. In the 1981 Agricultural Census farm operators reported age by five-year age groups which precludes detailed analysis of actual ages.

It was nevertheless suggested that some proportional indication of the age of farm operators could be obtained by grouping numbers of operators according to three classes: less than 35 years old; 35 - 65 years old; and greater than 65 years old.

Calculations for all E.A.'s were made on this basis (Appendix F). The results were, however, somewhat skewed due to the small total numbers in some E.A.'s (minimum number of operators = 11) and the even smaller numbers per age grouping. Though with a larger sample group such a calculation may have greater validity, the results in the present analysis were too distorted for reliability as an indicator. Age of farm operator was consequently rejected as a variable.

Off-farm work

This was discussed as a potential indicator in most meetings with the experts. Measurement of days of off-farm work would indicate commitment to farming. If more than three-quarters of the working year (over 229 days) were spent working off-farm, this would imply a low commitment. However, it was also considered that only if a distinction could be made between farmer types (namely hobby farmers, farm entrants, farm leavers) would this indicator be of value.

A study was described (Mage, 1975) that determined thresholds at which off-farm work affected farm sizes and enterprises. The level of analysis required for such a model is, however, beyond the scope of this study. Data availability also proved a factor in the decision to reject this variable.

ALTERNATIVE ANALYSES AND THE PROPOSED METHODOLOGY

There was some concern over the suggested high, medium, low cutoff points suggested for the three initial indicators. It was felt that such cutoffs should be decided more on a theoretical basis than on mathematical considerations. This was agreed upon and, for each indicator, discussed in some detail. However, apart from work on population density, the experts were unable to cite other research where relevant cutoffs had been established.

The treatment of the three indicators as equal was also questioned and the Ontario Hydro study (1979) cited as an example of the weighting of indicators.

In the Ontario Hydro study the proportional values for each variable, (percent of E.A. farmed; percent of E.A. owned and farmed by the operator; and farm population as a percent of total population) were mapped using "seven equal area divisions to avoid the necessity to rationalize arbitrary cutoff points in the data" (1979, p. 24). When the three variables were combined to form an index of agricultural-community strength, a 50% weighting was given to non-farm population, and a 25% weighting to each of the other two variables.

When asked what an appropriate weighting would be in this study, none of the experts was prepared to state which variable(s) should be given greater weight.

The high, medium, low categorization of variables presented no conceptual problems to most of the experts who considered it an adequate means of providing some indication of a relative degree of urban pressure. The justification of weighting on a high, medium, low basis for each variable would be an equivalent process and equally subjective to the rationalization of the relative strength of each variable. Either process was considered acceptable for the present analysis. It was decided, therefore, to retain the high, medium, low categories. A relative

weighting of variables also became implicit in the final analysis and percent of improved farmland rented and the percent of rural non-farm population were judged to be of greater value as indicators than the percent of E.A. not farmed. (see p. 36).

CONCLUSIONS

Based on the initial indicator selection and input from the experts the following three variables were adopted as the basis of identifying urban shadow E.A.'s in OWMC Candidate Areas:

- percent of E.A. improved farmland rented;
- percent of E.A. not farmed;
- percent of rural non-farm population.

It was also decided to retain the high, medium, low ranking of indicator values as the method of data analysis. Details of cutoff points and indicator rankings are contained in the following chapter.

CHAPTER 4

IDENTIFICATION OF URBAN SHADOW ENUMERATION AREAS

SUMMARY

The cutoff points for each of the three selected indicators and the system of ranking to be used in the data analysis are first described. The calculated values for the three indicators for each E.A. are then classified into high, medium and low categories. First and second order urban shadow E.A.'s are identified according to the system of ranked values. The urban shadow E.A.'s are examined in more detail to verify their selection.

INDICATOR CUTOFF POINTS

The three indicators were evaluated based on the range and distribution of values recorded throughout OWMC Candidate Areas and comparison with provincial and candidate area averages. As little research came to light that had attempted to establish threshold values for any of the three indicators (the exception being Russwurm's work with non-farm population;

see p. 14), the determination of cutoff points was based on a subjective evaluation of the relative significance of the values.

Percent of E.A. improved farmland rented

The values for this indicator ranged from a low of 11% to a high of 100%+; the latter anomaly is an outcome of census farm data collection (see p. 18). For this indicator the majority of values was below 50% (candidate areas mean = 42.3%). Hence, it was judged that when values exceeded 50%, this was indicative of an overly high proportion of improved farmland rented. The medium/low ranges were subdivided according to the range of values 11 - 50%, the mid-point being 30%; thus 11 - 30% values were classed as low and 31 - 50% values as medium.

Percent of E.A. not farmed

Where greater than 50% of an E.A. is not farmed it can be hypothesized that the farm community does not have a considerable impact on the land resource. As the distribution of values for this indicator ranged from 0 to 94%, the 25% and 50% cutoffs were judged a reasonable class differentiation.

Percent of rural non-farm population

The majority of rural non-farm population values are high throughout the candidate areas and do not present a wide range and distribution for clear demarcation of high, medium and low categories. The average for 1981 in the candidate areas was 78.6% and in only two E.A.'s (Haldimand 058 and 103) was farm population greater than rural non-farm population.

It was decided to divide this indicator into two categories—a high value of 85% and over and a residual group of less than 85% (given medium status for classification purposes). The high designation accounted for over a third of the total group and was slightly above the Province of Ontario average of 82.3%. Only the two Haldimand E.A.'s (058 and 103) could reasonably be considered to have a low ranking value.

For the three indicators the allocated high, medium, low classes were as follows:

	CLASS		
	HIGH	MEDIUM	LOW
. percent E.A. improved farmland rented	>50%	31-50%	11-30%
. percent E.A. not farmed	>49%	25-49%	<25%
. percent rural non-farm population	≥85%	<85%	-

RANKING SYSTEM

Four categories of urban pressure were devised based on the combined ranking of the three indicators, as follows:

Category	Decision Rules		
	% EA Improved Farmland Rented	% EA Not Farmed	% Rural Non-Farm Population
1. 1st Order Urban Shadow	H*	H	H
2. 2nd Order Urban Shadow	H	M	H
3. Medium Urban Pressures	H	M	M
	H	L	H or M
	M	H	H or M
	M	M	H
	M	M	M
4. Low Urban Pressures	all other combinations of ranked values		

The 1st Order Urban Shadow was defined by a combination of high rankings for all three indicators.

The percent of improved farmland rented and the percent of rural non-farm population were considered the most discriminating variables. The proportion of improved farmland rented is linked to the use of the

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*Indicator Class: H = high, M = medium, L = low.

land resource and has a direct tie with uncertainty and loss of control over the land use for farmers. The proportion of non-farm population has been identified as one of the stronger indirect influences on agriculture in urban shadows. Although the proportion of E.A. not farmed is an important indicator of urban effects, it includes land in other rural land uses such as recreational areas and woodlots, and is therefore not as discriminating. Accordingly, a Second Order Urban Shadow category was defined where the percent of improved farmland rented and the percent of rural non-farm population rank high and the percent of E.A. not farmed ranks medium.

Medium Urban Pressure Enumeration Areas were designated as those with a combination of high and medium rankings for the three indicators. A low rank for the percent E.A. not farmed was allowed when the other two variables ranked high or medium.

All other combinations of ranked values were designated as Low Urban Pressure Enumeration Areas.

ANALYSIS OF CANDIDATE AREA ENUMERATION AREAS

The recorded percent values, the high, medium, low indicator classifications and ranked type category of each candidate area E.A. are

listed in Appendix G. Map E.U4 shows the distribution of E.A.'s in the candidate areas based on the four-part ranking system of first and second order urban shadow, medium and low urban pressures. This map is included in the "SITE SELECTION PROCESS - PHASE 3B: SELECTION OF CANDIDATE SITES - Technical Data Map Portfolio." It is evident from the distribution that the major urban shadow concentrations are found in the Region of Peel, principally in the Municipality of Mississauga and in the south eastern section of the Niagara Peninsula within the municipalities of Thorold, Niagara Falls, Welland, Port Colborne and Fort Erie.

The nine E.A.'s that ranked as first order and the five E.A.'s that ranked as second order urban shadow are listed in Table 4-1.

Each of the 14 E.A.'s identified were examined in detail. Additional material was consulted with the objective of testing the selection. Air photos were consulted to determine if residential development is scattered or clustered and to identify other physiographic or site-specific reasons for excluding E.A.'s. On the basis of closer examination 12 E.A.'s were retained. Glanbrook 101, 014 and Haldimand 113 were removed from urban shadow designations for the following reasons:

Glanbrook 101,014 - is eliminated on the basis that the candidate area within the E.A. boundary is insufficient to provide a site for a waste disposal facility. In addition, this E.A. is the site of Mount Hope Airport. The airport occupies nearly half of the E.A. land area which accounts for the high proportion of non-farm land use.

TABLE 4-1

URBAN SHADOW ENUMERATION AREAS

	E.A. IDENTIFICATION		INDICATOR CLASS*		
			1	2	3
(1)	1st Order Urban Shadow				
1.	Fort Erie	018	H	H	H
2.	Thorold	112,151	H	H	H
3.	Welland	001,051,052	H	H	H
4.	Mississauga	268	H	H	H
5.	Mississauga	273	H	H	H
6.	Mississauga	201	H	H	H
7.	Milton	167	H	H	H
8.	Brampton	303	H	H	H
9.	Glanbrook**	101,014	H	H	H
(2)	2nd Order Urban Shadow				
10.	Fort Erie	021	H	M	H
11.	Port Colborne	B	H	M	H
12.	Niagara Falls	003, 010	H	M	H
13.	Welland	002	H	M	H
14.	Haldimand**	113	H	M	H

1. % E.A. improved farmland rented
2. % E.A. not farmed
3. % E.A. rural non-farm population

* H = high, M = medium

** Dropped for reasons given on page 38 and 40.

Source: Based on analysis of data from 1981 Agricultural Census and 1981 Population Census.

Haldimand 113 - is eliminated on the basis that a high proportion of the rural non-farm population is concentrated along Highway 6 and in the northern section of the Town of Caledonia. This distribution of population has little apparent impact on the surrounding farm area.

CONCLUSIONS

The final number of urban shadow E.A.'s is twelve. These are located in two areas; the south eastern section of the Niagara Peninsula and the Halton-Peel area. No urban shadow E.A.'s are identified within the candidate area in the Regional Municipalities of Hamilton-Wentworth, Haldimand-Norfolk, or Brant County, nor in the central and southern townships of the Niagara Peninsula.

CHAPTER 5

SUMMARY AND CONCLUSIONS

SUMMARY

An objective of the report was to identify indicators that could show relative degrees to which the agricultural land base and the agricultural community have been affected by urban pressures. A review of literature on urbanization in rural areas brought to light the paucity of empirical research on the impact of urban pressure on agricultural land and agricultural communities.

Selected indicators and the proposed method of analysis were discussed with a number of recognized experts. As an outcome of the consultation process minor modifications were made to the indicators.

The three indicators used in the final analysis were:

- percent of E.A. improved farmland that is rented;
- percent of E.A. that is not farmed;
- percent of E.A. population that is classified as rural non-farm.

Additional confirmation of the selection of urban shadow E.A.'s was given by: analysis of agricultural trend data for 1961 to 1981 at the township and county level; examination of literature concerning agriculture in the candidate areas; and a survey of the level of agricultural protection accorded by local municipal plans and by-laws.

CONCLUSIONS

Twelve E.A.'s have been identified which satisfy the criteria adopted for defining the urban shadow. Within these E.A.'s, urban pressures or non-agricultural land-use pressures are considered to have sufficiently altered the agricultural land base and the agricultural community sufficiently to place the long-term future of agriculture in these lands in doubt.

It is recommended that any OWMC candidate sites that fall within the 12 urban shadow E.A. boundaries should be retained for more detailed examination, regardless of the soil capability and present cropping activity.

At the individual site specific level data can be obtained for such variables as the fragmentation and ownership of farmland resources and land values; such information can help to define differences in the degree of urbanization among alternate sites.

The siting of an OWMC facility in an area already subject to pressures for change from agricultural to non-agricultural uses would be potentially less disruptive than it would in a more stable agricultural area where the pressures are less evident.

APPENDIX A

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APPENDIX B

LIST OF ENUMERATION AREAS IN THE OWMC CANDIDATE AREAS

FORT ERIE: 018, 021, A (003, 006, 017, 019, 020, 022, 053)

PORT COLBORNE: 062, B (060, 066, 061, 112)

WAINFLEET: 115, 116, 117, 118, 119, 120, 121, 201, 202

LINCOLN WEST: 203, 204, 205, 206, 207, 208, 209, 210, 211, 215, 216, 168, 169, (212, 213, 214)

LINCOLN: 004, 010, 012

THOROLD: (113, 114, 112, 151)

NIAGARA FALLS: 001, 002, (003, 010)

WELLAND: 002, (001, 051, 052)

PELHAM: 167, 164, 163, 160, 159

HALDIMAND: 058, 059, 063, 064, 065, 103, 104, 105, 106, 113, 114

DUNNVILLE: 003, 054, 055, 057

ONONDOGA: 011, 012

STONEY CREEK: 151, 152

GLANBROOK: 001, 002 (004, 005, 006, 008, 007, 003, 011, 010, 012, 013) 015, 016, (018, 017, 101, 014)

ANCASTER: 103, 104, 105

NANTICOKE: 208, 209

BRANTFORD: 014

MISSISSAUGA: 268, 273

MILTON: 167, 166, 165, 164, 169

BURLINGTON: 264, (267, 268, 269)

CALEDON: 364

BRAMPTON: 201, 302, 303

APPENDIX C: VARIABLES CONSIDERED FOR USE IN URBAN SHADOW ANALYSIS

INDICATOR	DATA SOURCE & AREA OF ANALYSIS	METHOD OF ANALYSIS	RATIONALE & REMARKS	REFERENCES	STATUS
1. Land area farmed	1981 Agric. Census EA level	% comparison of farm and non-farm land area	- reflects land utilization - strength of agriculture. - EA's with less farmland within their boundaries are generally weaker agriculturally. - more so if EA non-farmland is dominated by urban related uses rather than rural (agreement forests, open spaces, etc.). - quality of land as important as quantity. - loss of farmland does not imply loss to urban uses. - few researchers have taken one census year - more have looked at change over time.	Bryant & Russwurm (1979) Brown (1977) Ontario Hydro (1979)	Retained
2. Farmland ownership/rental	1981 Agric. Census EA level	% comparison of land owned and rented	- most consistently used variable from literature review. - land owned and operated represents the best basis for stability within the farm community. - non-farmland ownership represents loss of control over land resource by farm community. - loss of decision-making in long-term use of land, loss of stability, greater insecurity, greater uncertainty. - leases - typically short - frustrates long-term planning for agriculture, possibly encourages abuse and mismanagement of land. - not known how much land is leased from farmer to farmer - land rented to a neighbour on a long-term basis can be very stable. - land rental is not entirely negative as much land acquired by non-farmers made available to farmers and increases land area for farm expansion. - lack of publicly accessible data on land ownership (not only farmland) creates uncertainty and increases speculation; "hard to find research evidence on the spatial pattern of non-farm ownership around cities". (Bryant, et. al., 1982, p. 30).	Brown (1977) Gertler & Hind-Smith (1962) Russwurm (many studies) Punter (1974) Ontario Hydro (1979) OECD (1979) Bryant (many studies) Phillips (1981) Fielding (1979) Harker (1976) Mackrandilal (1978)	Retained
3. Rural farm and rural non-farm population	1981 Population Census EA level	Proportional comparison of farm/non-farm rural population	- higher proportions of non-farm population indicative of 'urbanizing' pressures; - also implies less "political voice" for farm population and possible long term negative effect on agricultural community stability.	Russwurm (1970) Ontario Hydro (1979)	Retained
4. Changes in land area farmed (total, improved, unimproved, cropland)	1961-81 Agric. Census Township Level (EA boundaries changed drastically 1961-81)	Comparison of % changes over time	- absolute loss and specific loss (improved, unimproved etc.) of farmland over time - indicative of land use changes - some to urban use - but trends apparent in all farm areas in Ontario, not only those undergoing urbanization. - lack of consistency of measurement in census data over time. - Bryant & Greaves (1978) looked at rate of agric. land loss and pop. growth of CMA's - found no clear relationship between pop growth and agric. land loss.	Bryant (1976) Bryant & Greaves (1978) Martin (1975) Brown (1977) Russwurm (1970)	Rejected - trends apparent in all farm areas in Ontario. - EA boundaries not consistent over time.

INDICATOR	DATA SOURCE & AREA OF ANALYSIS	METHOD OF ANALYSIS	RATIONALE & REMARKS	REFERENCES	STATUS
5. Farm-size data (farms below 10 acres)	1971-76-81 Agric. Census Township Level (possibly EA level)	Increase in the number of farms of less than 10 acres	- Farm size in its own right not considered a good indicator - reflects land value, land quality, type of enterprise, etc. - farms less than 10 acres equated with hobby/amenity agriculture (except in specialty crop areas! e.g. Niagara). - problem with census farm definition, may exclude some "farms" in lower acreages.	Punter (1974) Brown (1977)	Rejected in study area (specialty crop areas have smaller farms)
6. Land-use data (intensity type of enterprise)	1961-81 Agric. Census Township Level	Comparison of land areas/or no. of farms per enterprise type over time	- from literature no conclusive evidence as to whether agric. in "urban shadow" areas is more intensive or less intensive compared with agric. elsewhere - some = more intensive short term gains/mining soil = inner fringe areas/others = less intensive hay/pasture - land awaiting development. - type of enterprise - literature supports view that land conversion in "urban shadow" creates land uses that can be considered indicative of the transitional nature of area (i.e. livestock (especially dairy) declines; poultry & pig prod. may increase; vegetables increase; amenity agric. enterprises - nurseries, mkt. gardens, horses & ponies, greenhouses increase).	OECD (1979) Brown (1977) Mackrandilal (1978)	Useful as support data
7. Livestock units	1981 Agric. Census	Livestock units calculated - all livestock given common value	- research has shown that some livestock enterprises decline in urban shadow/fringe but others increase. - low livestock units not necessarily indicative of urban pressure - could be specialty crop area. - census livestock units = an inventory of one point in time do not reflect intensity year round. - unit sales could not be substituted as data not collected 1981.	Ontario Hydro (1979)	Rejected See remarks
8. Land value data	Property assessment and real estate data Township level County/regional level (MOH - rated Ont. Hydro rural land appraisals as best data & OMAF rural real estate prices 1979)	Examination of ave. market value of land and value of land for agricult.	- land value considered to decrease with increasing distance from the urban core (concept weakened in (20th century - more dispersed manuf./indust. etc.). - increase in non-farm land ownership thought to have an inflationary effect on land prices - speculation in anticipation of future development. - areas where mkt. land values beyond value for agricultural use are those in which agricultural disinvestment more likely to occur. - for established farmers who own their land - high land values can be an asset - can use as equity for expanding farm, or as retirement investment. - for new farm entrants high land values = barrier to land acquisition. - land market characteristics also important (used by Martin, 1975) volume of sales; actors in mkt.; size of parcels sold.	Hunton (1976-UK) Ferguson (1975) Bryant (1982) Martin (1975) Reeds (1969) Brown (1977) Centre for Res. Devel. (1977) Bodnar (1982) Rodd (1976)	Rejected at the EA level of analysis

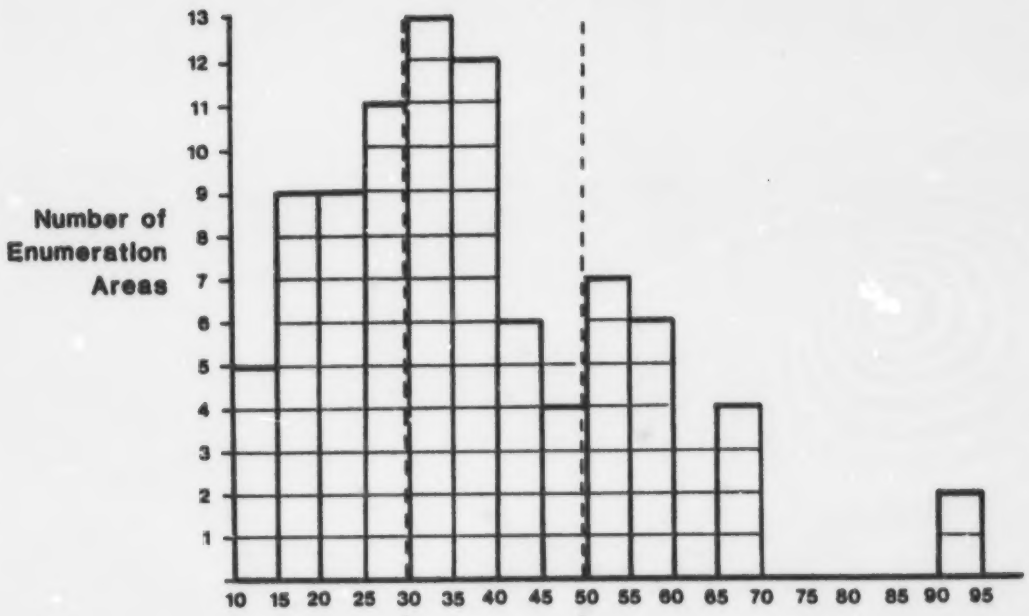
INDICATOR	DATA SOURCE & AREA OF ANALYSIS	METHOD OF ANALYSIS	RATIONALE & REMARKS	REFERENCES	STATUS
9. Capital value of farmland and buildings	Agric. Census 1961-81 Township Level	Trends of change in capital value - farm	- opinions that farm capital investment is reduced as urbanization approaches - especially in conditions of uncertainty - Martin examined level of farm investment (study area) against provincial average. - where conditions favourable for agriculture capt. and labour investment may increase along with farm intensity. - Russwurm (1970) "greatest increases in farm capitalization should occur in townships having greatest increase in non-farm population, as urban growth tends to drive up the dollar value of nearby land." - Mackrandilal found no significant difference in intensity of land use as measured by capital investment in land.	Arda Report #7 (1972) Martin (1975) Russwurm (1970) Mackrandilal (1978)	Rejected (opposing trends as a result of different forces)
10. Land Fragmentation (subdivision/ severances)	Min. of Housing Municipal data Township level (data constraint accessibility/ availability)	Number of rural subdivision applications and number of severances permitted per year - by township	- number of rural sub-divisions; vacant lots and undeveloped sub-divisions and number of severances permitted by land division committees and their intended land use = indicative of increasing non-farm activity. - Gertler & Hind-Smith (1962) used undeveloped sub-divisions as an indicator of indirect urban development. - Punter (1974) used number of severances permitted by land division committees as an indicator of exurban development.	Alberta Environmental Conservation Authority (1976) Punter (1974) Gertler & Hind-Smith (1962)	Useful indicator data not available for all of candidate areas
11. Property Taxation	Assessment roll Data - available at Township Offices (Constraints - time & cost of collection)	-Property tax per acre -% property tax assessed as farm/ non-farm	- relatively few studies have been undertaken using property - tax data - constraints on collection for large area - property - taxes higher in areas experiencing urban pressures due to increased demand for services etc. by non-farm households.	Russwurm (1970) Bryant & Russwurm (1979) Krueger (1957) Gertler & Hind-Smith (1962) Morgan (1978) Van Vuuren & Cumming (1978)	Rejected (data constraint)
12. Average Age of Farm Operator	1971-76-81 Ag. Census Township Level (data constraints - ave. age not given - only % distributions per 5 year age groups)	Comparison of ave. age of operators either for one time period/or over a number of time periods	- older farm operators symptomatic of pressures which discourage young entrants - high land costs around urban areas/lack of perceived opportunities in agriculture. - predominance of older age groups imply instability.	Arda Report #7 (1972) Martin (1975) Mackrandilal (1978)	Rejected (data constraints)
13. Part-time Farming	1981 Agric. Census Township Level EA Level	-number & % of farms reporting from 229-365 days off-farm work -ave. no. of days of off-farm work in 1981 per area of analysis	- there is no conclusive evidence as to whether part-time farming is positive or negative vis a vis the agricultural community. - increased incidence of part-time farming in 'urban pressure' areas due to greater opportunity for employment off-farm. - farm operators reporting 229-365 days off-farm work indicative of low commitment to farming = weekend or hobby farmer. - expectation that higher average of days off-farm found in "urban pressure" areas.	Punter (1974) McKay (1976) Brown (1977) Troughton (1976a) OECD (1979) Phillips (1981) Martin (1975) Arda Report #7 (1972) Bryant et al (1982)	(data availability at EA level) (no pattern clear at township level)
14. Non-resident Farm Operators	1981 Agric. Census Township Level EA Level	Non-resident farm operators as % total operators	- higher numbers of non-resident operators would be found in "urban shadow" areas where farms could be maintained on weekend/hobby basis by urban residents.	Ont. Hydro (1979) Phillips (1981)	(data availability at EA level) (no. pattern clear at township level)

INDICATOR	DATA SOURCE & AREA OF ANALYSIS	METHOD OF ANALYSIS	RATIONALE & REMARKS	REFERENCES	STATUS
15. Hired Labour	1981 Agric. Census Township Level Ea Level	Number of hired farm labourers	- lower numbers of hired labour expected near urban areas due to greater pull of higher paid employment in urban core. - farm labour, however, also related to farm size, technological substitution, land use (specialty crops/labour intensive operations).	Martin (1975) OECD (1979)	Rejected See remarks
16. Population Density	1981 Pop. Census Ea Level	Comparison of pop. densities per ea. (pop. per acre)	- Russwurm used pop. per sq. mile as a complementary absolute measure to the relative non-farm pop. % measure (1970) <25 per sq. mile = 'rural' 25-49 per sq. mile = 'semi-rural' 50-119 per sq. mile = 'semi-urban' >120 per sq. mile = 'urbanising' - increase in number and density of pop. = indicative of urban pressures. - (could subtract clusters/"police villages" & then do density of scattered non-farm pop.)	Russwurm (1970) OECD (1979)	Rejected (farm - non-farm pop. data considered clearer differentiation)
17. Population Growth	1976-81 Pop. Census Ea Level	Comparison of absolute growth & rate of growth between ea's	- high absolute growth and high rate would indicate increasing degree of urbanization (farm pop. = consistently declining in Ontario).	- -	Rejected (being used by IER)
18. Housing Data - Non-farm Residential Development	Ontario Hydro Customer Listings Assessment Roll Data* (*Data constraints - time & cost collection)	Comparison of number of farm residences with non-farm especially low density rural development	- Ontario Hydro customer listings divide between: farm - high density rural (hamlets, villages) - low density rural (scattered) - intermittent residential (seasonal, cottages). - low density rural development = greatest threat to agricultural land resource - and most critical indicator of urbanization. - Bryant et al (1982) discuss ratios of housing units farm: non-farm as an indicator of 'control' over decision-making in rural areas (no test made of this assumption). - Russwurm (1980) also devised scaling of rural → urbanizing based on ratios from households: non-farm households.	Punter (1974) Arda Report #7 (1972) Russwurm (1970) (1980) Bryant et al (1982) Wiltshire (1973) Rodd (1976) Found & Michie (1976) Brown (1977) Smit et al (1979)	Rejected (farm/non-farm pop. = sufficient indicator)
19. Number of Commuters	1981 Pop. Census Journey to Work Data Township Ea	Proportion of commuters in employed population of area of analysis	- high proportion of commuters indicative of urban focus of rural area.	Russwurm (1976) OECD (1979)	Rejected (data constraints)
20. Legislation - Municipal Plans & By-Laws	Not at sufficiently small unit area	Subjective evaluation of policies	- subjective analysis of planning policies and municipal by-laws - weak/strong regarding protection of agric. land. - local and regional municipalities have applied increasingly detailed and rigid controls on urban development. - strict zoning for urban boundaries relieves uncertainty for future allocation of agric. land.	-township and regional municipality official plans	Background data
21. Conflicts & Incompatibilities (as recorded in literature)	- - -	Subjective evaluation	- observed problems by farmers - theft/vandalism etc. - restrictions on agric. - complaints/odour etc. and min. distance regulations (Agric. Code of Practice). - insecurity of future of farming - issues and concerns.	Centre for Res. Dev. (1977) Project Mississauga RDOP (1980/81) Halton Rural Forum Fitzsimons (1983) Rodd (1976)	Background data

APPENDIX D

THREE SELECTED INDICATORS AND INITIAL CUTOFF VALUES USED IN DISCUSSION WITH RECOGNIZED EXPERTS

FIGURE 1 PERCENT OF ENUMERATION AREA FARMLAND THAT IS RENTED

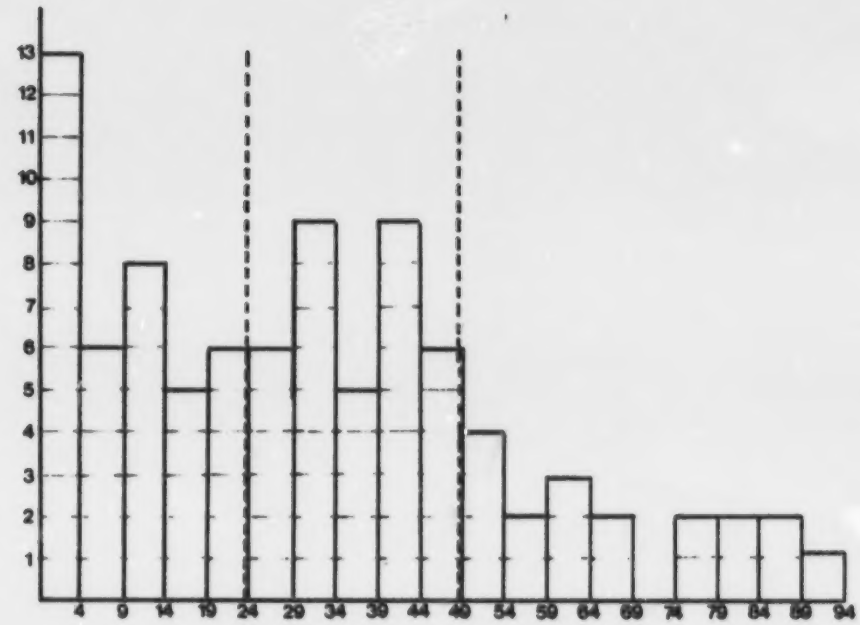


					Total
Total Number	33	36	22	=	91
%	36%	40%	24%	=	100%
Categories	Low % Farmland Rented	Medium % Farmland Rented	High % Farmland Rented		
Range	11-30%	31-50%	>50%		

Study Area Mean = 38.2%

Source : 1981 Census of Agriculture, Statistics Canada

FIGURE 2. PERCENT OF ENUMERATION AREA NOT FARMED*



% Enumeration Area Not Farmed

				Total
Total No's	38	35	42	= 91
%	42	38	20	= 100%
Categories	Low % not farmed	Medium % not farmed	High % not farmed	
Range	<25%	25 - 49%	>49%	

Study Area Mean = 31.5%

Source: 1981 Census Of Agriculture, Statistics Canada

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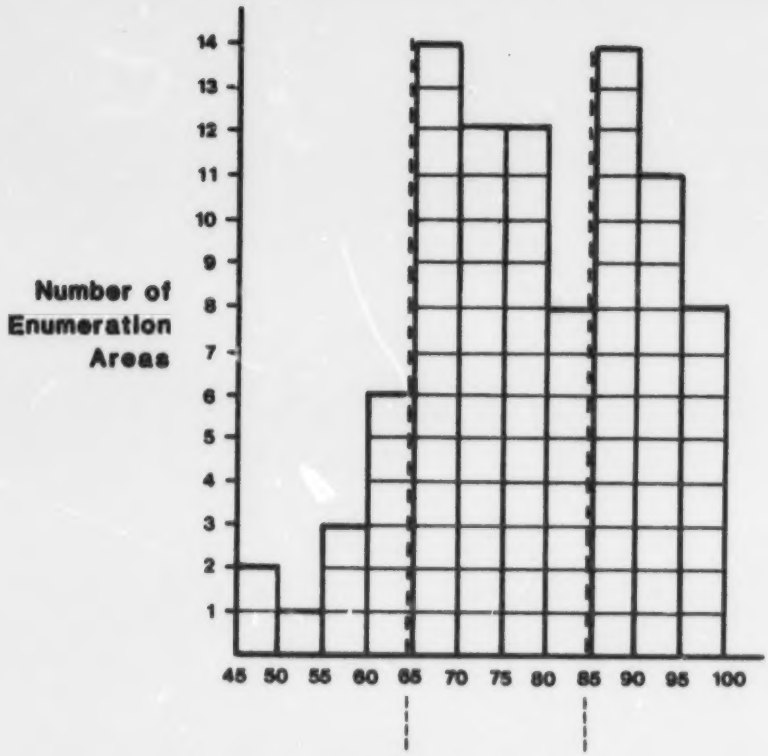
* The inverse of the percent of enumeration area farmed selected after review with the experts.

FIGURE 3 PERCENT OF RURAL NON-FARM POPULATION *



					Total
Total Number	12	46	33	=	91
%	13%	51%	36%	=	100%
Categories	Low % Rural Non-Farm Pop.	Medium % Rural Non-Farm Pop.	High % Rural Non-Farm Pop.		
Range	46-65%	66-85%	86-100%		

Study Area Mean = 78.6%

Source : 1981 Population Census,Statistics Canada

*** Does Not Include The Urban Population**

APPENDIX E

LIST OF RECOGNIZED EXPERTS CONSULTED

1. L. R. G. Martin, School of Urban and Regional Planning, University of Waterloo, - December 14, 1983.

2. L. H. Russwurm, Department of Geography, University of Waterloo, - December 14, 1983.

3. R. R. Kruegar, Department of Geography, University of Waterloo, - December 22, 1983.

4. J. A. Mage, Department of Geography, University of Guelph, - December 20, 1983.

5. Professor R.S. Rodd, Agricultural Economics and Extension Education, University of Guelph - December 5, 1984.

THE MINUTES OF THE MEETINGS ARE ON FILE WITH ECOLOGISTICS LIMITED.

APPENDIX F

ADDITIONAL VARIABLES TESTED AND REJECTED

1. PERCENT OF TOTAL FARMLAND THAT IS RENTED

ENUMERATION AREA	%
FT. ERIE	
018	51
021	54
A	12
PORT COLBORNE	
B	60
062	36
WAINFLEET	
115	38
116	43
117	30
118	33
119	19
120	35
121	18
201	23
202	13
LINCOLN WEST	
203	22
204	14
205	14
206	19
207	22
208	24
209	28
210	29
211	29
212,213,214	37
215	41
216	20
168,169	13

ENUMERATION AREA	%
LINCOLN	
004	16
010	25
012	32
THOROLD	
113,114	38
112,151	67
NIAGARA FALLS	
001	37
002	65
003,010	60
WELLAND	
002	58
001,051,052	51
PELHAM	
167	32
164	22
163	29
160	28
159	33
HALDIMAND	
058	27
059	38
063	35
064	36
065	33
103	27
104	44
105	42

ENUMERATION AREA	%
HALDIMAND cont'd	
106	20
113	52
114	20
DUNNVILLE	
003	34
054	34
055	17
057	20
ONONDOGA	
011	44
012	28
STONEY CREEK	
151	55
152	22
GLANBROOK	
001	40
002	35
004,005	65
006,008	29
007,003	44
011,010	38
012,013	31
015	21
016	23
018,017	46
101,014	49

ENUMERATION AREA	%
ANCASTER	
103	52
104	52
105	37
NANTICOKE	
208	37
209	30
BRANTFORD	
014	35
MISSISSAUGA	
268	91
273	69
MILTON	
167	66
166	32
165	60
164	63
169	65
BURLINGTON	
264	49
267,268,269	56
CALEDON	
364	45
BRAMPTON	
201	91
302	40
303	67

Source: 1981 Census of Agriculture, Statistics Canada.

2. POPULATION DENSITY

	RURAL POP. DENSITY (Pop. ÷ land area = no. people per ha)	RURAL FARM	RURAL NON-FARM
FT. ERIE			
018	0.32	0.02	0.30
021	0.30	0.02	0.28
A	0.39	0.02	0.37
PORT COLBORNE			
B	0.17	0.02	0.15
062	0.19	0.02	0.17
WAINFLEET			
115	0.22	0.05	0.17
116	0.17	0.02	0.15
117	0.27	0.05	0.22
118	0.27	0.07	0.20
119	0.14	0.02	0.12
120	0.30	0.05	0.25
121	0.29	0.07	0.22
201	0.27	0.05	0.22
202	0.15	0.05	0.10
LINCOLN WEST			
203	0.24	0.07	0.17
204	0.12	0.05	0.07
205	0.20	0.05	0.15
206	0.04	0.02	0.02
207	0.17	0.07	0.10
208	0.17	0.05	0.12
209	0.17	0.05	0.12
210	0.19	0.07	0.12
211	0.17	0.05	0.12
212,213,214	0.19	0.07	0.12
215	0.27	0.10	0.17

	RURAL POP. DENSITY (Pop. ÷ land area = no. people per ha)	RURAL FARM	RURAL NON-FARM
LINCOLN WEST - cont'd			
216	0.30	0.10	0.20
168,169	0.24	0.07	0.17
LINCOLN			
004	0.61	0.07	0.54
010	0.22	0.05	0.17
012	0.19	0.07	0.12
THOROLD			
113,114	0.20	0.00	0.20
112,151	(entirely urban pop.)		no data
NIAGARA FALLS			
001	0.14	0.02	0.12
002	0.25	0.05	0.20
003,010	0.24	0.02	0.22
WELLAND			
002	(entirely urban pop.)		no data
001,051,052	(entirely urban pop.)		no data
PELHAM			
167	0.27	0.07	0.20
164	0.42	0.10	0.32
163	(entirely urban pop.)		no data
160	0.30	0.05	0.25
159	0.27	0.05	0.22
HALDIMAND			
058	0.10	0.05	0.05
059	0.14	0.02	0.12

	RURAL POP. DENSITY (Pop. ÷ land area = no. people per ha)	RURAL FARM	RURAL NON-FARM
HALDIMAND cont'd			
063	0.15	0.05	0.10
064	0.15	0.05	0.10
065	0.12	0.05	0.07
103	0.10	0.05	0.05
104	0.09	0.02	0.07
105	0.12	0.05	0.07
106	0.15	0.05	0.10
113	0.32	0.02	0.30
114	0.22	0.05	0.17
DUNNVILLE			
003	0.17	0.05	0.12
054	0.49	0.02	0.47
055	0.15	0.02	0.12
057	0.10	0.05	0.05
ONONDOGA			
011	0.15	0.05	0.10
012	0.15	0.05	0.10
STONEY CREEK			
151	0.22	0.07	0.15
152	0.58	0.05	0.52
GLANBROOK			
001	0.22	0.05	0.17
002	0.32	0.05	0.27
004,005	0.39	0.02	0.37
006,008	0.49	0.02	0.47
007,003	0.52	0.05	0.47
011,010	0.35	0.05	0.30

	RURAL POP. DENSITY (Pop. ÷ land area = no. people per ha)	RURAL FARM	RURAL NON-FARM
GLANBROOK cont'd			
012,013	0.62	0.05	0.57
015	0.49	0.02	0.47
016	0.35	0.05	0.30
018,017	0.76	0.02	0.74
101,014	0.84	0.02	0.82
ANCASTER			
103	0.22	0.05	0.17
104	0.22	0.07	0.15
105	0.24	0.07	0.17
NANTICOKE			
208	0.17	0.05	0.12
209	0.17	0.07	0.10
BRANTFORD			
014	0.15	0.05	0.10
MISSISSAUGA			
268	0.25	0.00	0.25
273	0.19	0.02	0.17
MILTON			
167	0.14	0.02	0.12
166	0.17	0.02	0.15
165	0.12	0.02	0.10
164	0.35	0.10	0.25
169	0.30	0.05	0.25
BURLINGTON			
264	0.25	0.05	0.20
267,268,269	0.59	0.02	0.57

	RURAL POP. DENSITY (Pop. ÷ land area = no. people per ha)	RURAL FARM	RURAL NON-FARM
CALEDON			
364	0.19	0.02	0.17
BRAMPTON			
201	0.24	0.02	0.22
302	0.22	0.02	0.20
303	0.17	0.02	0.15

3. AGE OF OPERATOR

	Less Than 35 Years		35 to 64 Years		Over 64 Years	
	#	%	#	%	#	%
FT. ERIE						
018	1	4.8	18	85.7	2	9.5
021	3	9.6	26	83.9	2	6.5
A	1	3.6	19	67.9	8	28.6
PORT COLBORNE						
B	3	10.0	22	73.3	5	16.7
062	5	29.4	11	64.7	1	5.9
WAINFLEET						
115	7	18.4	24	63.2	7	18.4
116	6	33.3	12	66.6	-	--
117	2	6.5	24	77.4	5	16.1
118	5	14.7	27	79.4	2	5.9
119	4	14.2	20	71.4	4	14.2
120	3	10.7	23	82.1	2	7.1
121	3	9.4	25	78.1	4	12.5
201	4	11.4	25	71.4	6	17.1
202	7	20.6	24	70.6	3	8.8
LINCOLN WEST						
203	9	15.8	40	70.2	8	14.0
204	4	11.1	30	83.3	2	5.5
205	9	18.8	36	75.0	3	6.3
206	9	14.3	49	77.8	5	7.9
207	8	12.1	50	75.8	8	12.1
208	10	22.7	32	72.7	2	4.5
209	10	17.5	44	77.2	3	5.3
210	14	24.6	30	68.4	4	7.0
211	10	20.8	34	70.8	4	8.3
212,213,214	13	18.0	54	75.0	5	6.9
215	3	7.0	34	79.1	6	14.0
216	5	10.0	41	82.0	4	8.0
168,169	7	20.6	24	70.6	3	8.8

	Less Than 35 Years		35 to 64 Years		Over 64 Years	
	#	%	#	%	#	%
LINCOLN						
004	1	5.6	15	83.3	2	11.1
010	4	13.3	24	80.0	2	6.7
012	7	12.3	45	78.9	5	8.8
THOROLD						
113,114	3	25.0	7	58.3	2	16.7
112,151	1	9.1	9	81.8	1	9.1
NIAGARA FALLS						
001	2	12.5	9	56.3	5	31.3
002	4	16.7	17	70.8	3	12.5
003,010	1	4.0	20	80.0	4	16.0
WELLAND						
002	2	13.3	12	80.0	1	6.7
001,051,052	2	18.2	8	72.7	1	9.1
PELHAM						
167	6	17.1	24	68.6	5	14.3
164	1	4.0	22	88.0	2	8.0
163	2	6.3	22	68.8	8	25.0
160	2	8.3	22	91.7	-	--
159	3	10.7	22	78.6	3	10.7
HALDIMAND						
058	11	18.6	45	76.3	3	5.1
059	7	17.5	25	62.5	8	20.0
063	9	24.3	24	64.9	4	10.8
064	4	10.2	30	76.9	5	12.8
065	8	16.3	35	71.4	6	12.2
103	9	17.6	35	68.6	7	13.7
104	5	16.7	22	73.3	3	10.0
105	4	10.0	31	77.5	5	12.5

	Less Than 35 Years		35 to 64 Years		Over 64 Years	
	#	%	#	%	#	%
HALDIMAND - cont'd						
106	10	16.9	41	69.5	8	13.6
113	3	21.4	7	50.0	4	28.6
114	1	5.6	15	83.3	2	11.1
DUNNVILLE						
003	2	4.5	36	81.8	7	15.9
054	3	16.7	15	83.3	-	--
055	8	23.5	19	55.9	7	20.6
057	15	27.3	38	69.0	2	3.6
ONONDOGA						
011	6	11.1	40	74.0	8	14.8
012	10	18.9	38	71.7	5	9.4
STONEY CREEK						
151	4	7.1	43	76.8	9	16.1
152	-	--	15	83.3	3	16.7
GLANBROOK						
001	6	20.7	22	75.9	1	3.4
002	2	8.7	18	78.3	3	13.0
004,005	2	6.0	27	81.8	4	12.1
006.008	-	--	14	77.8	4	22.2
007,003	1	4.5	19	86.4	2	9.1
011,010	6	20.0	22	73.3	2	6.7
012,013	3	13.0	14	60.9	6	26.1
015	1	9.1	7	63.6	3	27.3
016	2	9.5	13	61.9	6	28.6
018,017	1	5.6	12	66.7	5	27.8
101,014	2	11.8	12	70.6	3	17.6

	Less Than 35 Years		35 to 64 Years		Over 64 Years	
	#	%	#	%	#	%
ANCASTER						
103	4	11.8	23	67.6	7	20.6
104	3	7.1	34	81.0	5	11.9
105	2	5.7	30	85.7	3	8.6
NANTICOKE						
208	4	12.5	25	78.1	3	9.4
209	8	20.0	26	65.0	6	15.0
BRANTFORD						
014	5	20.8	18	75.0	1	4.2
MISSISSAUGA						
268	1	5.6	13	72.2	4	22.2
273	1	6.3	10	55.6	5	27.8
201	1	8.3	8	66.7	3	25.0
MILTON						
167	5	17.9	21	75.0	2	7.1
166	4	11.1	27	75.0	5	13.9
165	3	18.8	12	75.0	1	6.3
164	11	21.6	30	58.8	10	19.6
169	4	13.8	22	75.9	3	10.3
BURLINGTON						
264	9	25.7	20	57.1	6	17.1
267,268,269	3	11.5	20	76.9	3	11.5
CALEDON						
364	5	15.6	23	71.9	4	12.5
BRAMPTON						
302	3	20.0	8	53.3	4	26.7
303	2	13.3	12	80.0	1	6.7

Source: 1981 Population Census, Statistics Canada.

APPENDIX G

INDICATOR VALUES, CLASSES AND RANKED TYPE - CANDIDATE AREA E.A'S

	1. Percent of E.A. Improved Farmland Rented		2. Percent of E.A. Not Farmed		3. Percent of Rural Non-Farm Population		Type of E.A.*
	%	Class	%	Class	%	Class	
FT. ERIE							
018	56	H	53	H	93	H	1
021	60	H	41	M	89	H	2
A	18	L	90	H	95	H	4
PORT COLBORNE							
B	66	H	46	M	85	H	2
062	41	M	62	H	86	H	3
WAINFLEET							
115	44	M	42	M	80	M	3
116	47	M	56	H	84	M	3
117	32	M	31	M	82	M	3
118	36	M	0	L	74	M	4
119	21	L	49	M	78	M	4
120	39	M	29	M	81	M	3
121	21	L	50	H	78	M	4
201	26	L	32	M	78	M	4
202	14	L	24	L	68	M	4
LINCOLN WEST							
203	25	L	13	L	71	M	4
204	16	L	22	L	57	M	4
205	16	L	31	M	70	M	4
206	21	L	7	L	65	M	4
207	25	L	29	M	60	M	4
208	29	L	18	L	69	M	4
209	35	M	41	M	75	M	3
210	33	M	0	L	62	M	4
211	35	M	24	L	69	M	4
212,213,214	41	M	32	M	66	M	3
215	46	M	0	L	67	M	4
216	21	L	33	M	69	M	4
168,169	15	L	2	L	71	M	4

	1. Percent of E.A. Improved Farmland Rented		2. Percent of E.A. Farmed		3. Percent of Rural Non-Farm Population		Type of E.A.*
	%	Class	%	Class	%	Class	
LINCOLN							
004	18	L	68	H	89	H	4
010	29	L	33	M	74	M	4
012	37	M	18	L	62	M	4
THOROLD							
113,114	43	M	66	H	96	H	3
112,151	72	H	75	H	100	H	1
NIAGARA FALLS							
001	46	M	86	H	90	H	3
002	68	H	31	M	82	M	3
003,010	71	H	44	M	92	H	2
WELLAND							
002	62	H	35	M	100	H	2
001,051,052	56	H	81	H	100	H	1
PELHAM							
167	37	M	41	M	74	M	3
164	24	L	47	M	78	M	4
163	35	M	35	M	100	H	3
160	31	M	40	M	81	M	3
159	38	M	27	M	81	M	3
HALDIMAND							
058	30	L	9	L	48	M	4
059	45	M	7	L	80	M	4
063	37	M	26	M	72	M	3
064	39	M	8	L	67	M	4
065	37	M	10	L	67	M	4
103	30	L	15	L	49	M	4
104	48	M	0	L	67	M	4
105	47	M	0	L	69	M	4

	1. Percent of E.A. Improved Farmland Rented		2. Percent of E.A. Not Farmed		3. Percent of Rural Non-Farm Population		Type of E.A.*
	%	Class	%	Class	%	Class	
HALDIMAND - cont'd							
106	22	L	0	L	65	M	4
113	53	H	31	M	89	H	2
114	21	L	36	M	76	M	4
DUNNVILLE							
003	39	M	26	M	69	M	3
054	37	M	4	L	93	H	4
055	23	L	12	L	72	M	4
057	25	L	32	M	52	M	4
ONONDOGA							
011	48	M	11	L	63	M	3
012	30	L	9	L	66	M	4
STONEY CREEK							
151	60	H	0	L	64	M	3
152	25	L	56	H	89	H	4
GLANBROOK							
001	42	M	6	L	79	M	4
002	37	M	22	L	85	H	4
004,005	69	H	0	L	90	H	3
006,008	31	M	46	M	91	H	3
007,003	45	M	48	M	91	H	3
011,010	39	M	13	L	88	H	4
012,013	18	L	40	M	91	H	4
015	22	L	22	L	91	H	4
016	27	L	40	M	87	H	4
018,017	49	M	38	M	95	H	3
101,014	55	H	61	H	96	H	1
ANCASTER							
103	55	H	0	L	76	M	3
104	55	H	10	L	71	M	3
105	41	M	24	L	66	M	4

	1. Percent of E.A. Improved Farmland Rented		2. Percent of E.A. Farmed		3. Percent of Rural Non-Farm Population		Type of E.A.*
	%	Class	%	Class	%	Class	
NANTICOKE							
208	40	M	37	M	76	M	3
209	33	M	21	L	59	M	4
BRANTFORD							
014	37	M	43	M	73	M	3
MISSISSAUCA							
268	100**	H	52	H	96	H	1
273	76	H	87	H	92	H	1
201	96	H	83	H	92	H	1
MILTON							
167	71	H	54	H	87	H	1
166	61	H	0	L	78	M	3
165	70	H	48	M	79	M	3
164	73	H	18	L	74	M	3
169	70	H	25	M	82	M	3
BURLINGTON							
264	55	H	17	L	79	M	3
267,268,269	62	H	17	L	98	H	3
CALEDON							
364	49	M	0	L	83	M	4
BRAMPTON							
302	42	M	76	H	88	H	3
303	71	H	60	H	89	H	1

(*Type of E.A. ranking, see p.36)

(**see p.18)

APPENDIX H

AGRICULTURAL CHANGE IN CANDIDATE AREAS WITH PARTICULAR FOCUS ON MUNICIPALITIES CONTAINING URBAN SHADOW ENUMERATION AREAS

SUMMARY

This appendix provides support evidence for the selection of the twelve urban shadow E.A.'s. Agricultural data describing a number of selected variables are examined for the period 1961 to 1981, at the township, county and regional municipality level. The purpose is to ascertain some of the principal trends in the farm economy across the candidate areas. Special emphasis is given to municipalities containing urban shadow E.A.'s. Secondary data sources provide additional evidence of agricultural change and a review of municipal policies and official plans provides insight on the attitude towards agricultural resources in local economies.

SELECTED AGRICULTURAL DATA 1961-81

It was not feasible to analyze agricultural change at the E.A. level (see p. 18), but it was nevertheless possible to examine data at the township, county and regional municipality level. Data from the agricultural census over the period 1961 to 1981 were assembled for the candidate areas for the following variables (see p. H-10).

- farmland area (total, improved, unimproved, cropland)
- cropping enterprises
- livestock enterprises
- capital value

Data for the Province of Ontario were used as a comparative measure. Though data were incomplete for a comprehensive trend analysis, a number of patterns were clearly evident. Emphasis is placed on patterns in areas containing urban shadow E.A.'s.

Farmland area: Throughout all candidate areas there has been a general trend of farmland loss since 1961. In terms of overall loss the Regional Municipality of Peel recorded the largest decline with a reduction of over one-third of farmland area between 1961 and 1981. This large loss was also noted in the 1972 ARDA report #7 (Centre for Resources Development, 1972):

> "In the Region of Peel, agricultural lands have been reduced 21% since 1961, the majority of the loss occurring in the Brampton - Meadowvale - Mississauga area of the Region."

Of this loss a very high proportion has been improved farmland ; it declined by 32% over the twenty-year period compared with a provincial decline of 7%.

Halton Region recorded a high farmland loss from 1961 to 1981 despite an apparent increase in the area of improved farmland from 1976 to 1981. This latter phenomenon, however, may be more associated with changes in

the definition of a census farm than any genuine increase in the area of improved farmland. Similar trends of increase in improved land from 1976 to 1981 are apparent for the five south eastern townships on the Niagara Peninsula as well as Port Colborne, Pelham and Fort Erie.

Cropland area for Ontario as a whole expanded by 12.3% from 1961 to 1981. In Peel the area under cropland showed an overall decrease over the twenty-year period, though figures indicate a slight increase in area between 1971 and 1976. Though the area under crops has expanded in Halton since 1970, the overall increase since 1961 has not equalled the provincial figure. Similarly, of all the Niagara Peninsula townships, only Ancaster (21.2%) and Wainfleet (29.9%) recorded an increase of cropland area greater than the provincial increase, the remainder having expanded cropland area, but below the provincial figure.

Crop enterprises: Examination of wheat and small grain enterprises is particularly revealing. For the Niagara Peninsula townships, wheat and small grains have increased in line with general trends for the Province of Ontario. In Peel and Halton, the increase in wheat and small grain operations exceed the provincial figures. Evidence from secondary sources attests to the importance of cash cropping, notably grain enterprises, in these two regions:

> "Most of the farmland is in grain and is being farmed on a short-term basis." (Project Mississauga, 1977, p. 44)
>
> "Cash cropping is especially common in Halton, because the farmer can utilize rented land instead of needing to own it at the current high prices." (R.D.O.P., 1980, p. 10)

Livestock enterprises: For the Regional Municipality of Peel there has been a trend towards reduction in all aspects of intensive livestock production. In Halton Region there has been a trend towards a reduced number of operators in intensive livestock enterprises. However, with the exception of miscellaneous specialty crops, more operators were engaged in cattle operations in 1981 than in any other enterprise. Most notable has been the reduction in head of livestock in the dairy industry, though in the case of poultry and hogs, per head figures have shown a slight increase from 1961 to 1981, but are below comparative provincial figures.

For the Niagara Peninsula the data reveal that numbers involved in dairying and the total head of dairy cattle have declined throughout the region except in the Townships of West Lincoln, Dunnville and Wainfleet. Per head figures of poultry and hogs show an increase in most townships though the number of operators involved in these enterprises has declined.

Capital value: Total farm capital value rose by 736% between 1961 and 1981 in the Province of Ontario. All counties and regions in the Niagara Peninsula experienced lower per capita increases than the province, but both Halton and Peel recorded higher proportional increases, principally reflecting the higher land values in these areas.

From this brief overview of five selected variables, it is evident that the Regional Municipality of Peel stands out as being the area that has experienced the greatest negative agricultural change over the period

1961 to 1981. While decline has also been evident in Halton, it has not been as extreme.

Lack of adequate data at the township level prevented closer differentiation between areas within the Niagara Peninsula, though even with limited data it is apparent that certain townships namely, West Lincoln, Haldimand, Dunnville and Wainfleet appear more agriculturally stable than others in the area.

SECONDARY SOURCE DATA AND PLANNING DOCUMENTS

A bibliographic list of references for candidate areas is contained on pages H-14 to H-20. Material from key sources is used here to further describe some of the important characteristics and recent changes evident in the candidate areas containing urban shadow E.A.'s. In addition, a survey was undertaken of official regional and local municipal plans and policies. The results of this survey are given in table form on pages H-21 to H-30. Though based on subjective evaluation, a ranking of the degree of protection for agriculture was made in all cases where an official plan was available.

THE REGIONAL MUNICIPALITY OF PEEL

In this municipality, three urban shadow E.A.'s were identified in the Mississauga area and one in Brampton. Evidence from a detailed study undertaken in 1977 at the University of Guelph stated that:

> "The Mississauga study area is almost completely owned by development interests today with only one known owner-operator of a farm remaining." (Centre for Resources Development, 1977, p. 5)

Such data are corroborated by farm rental statistics whereby over 75% of improved farmland in the urban shadow E.A.'s was rented in 1981. Land values increased by 200% from 1961-77 and approached $74 000 (1976 average = $40 000) per hectare in parts of Mississauga; agriculture under these circumstances is not considered economically feasible.

Land fragmentation has also been a problem in Mississauga due to past severance policies. There has been an observed change in farm enterprises in the area with greater concentration on recreational farm-type uses. In addition, there has been a notable decline in agriculture support services. Farmland in Mississauga is perceived as an interim land use and there is no specific agricultural land use designation (other than non-urban) on the City of Mississauga Official Plan. Candidate area lands in Brampton similarly have no rural or agricultural land-use designation, though there are agricultural land-use possibilities within the Parkway Belt West.

THE REGIONAL MUNICIPALITY OF HALTON

Only one urban shadow E.A. was identified in the Halton Region to the south of the Town of Milton. One of the major concerns of the farm community in the Halton Region is land prices;

> "land is too expensive for a real farmer to buy." (Fitzsimons, 1982, p. 26)

Consequently, the proportion of land rented is high, over 70% throughout most of the area.

In the Halton Region, there has been a significant change in agriculture in recent decades,

> "there is a present trend of rapid decline of agricultural activity in Halton--agriculture cannot continue on a viable basis in this environment." (Regional Municipality of Halton, 1974)

The threat of urban pressures receded in the 1970's and the Region has moved towards strengthening and protecting the agricultural resources within its boundary. The Halton Region Official Plan states as one of its objectives to:

> "develop and maintain a permanently secure, economically viable agricultural industry."

Stricter severance and land use policies have been implemented during the 1970's. The local plan for the Town of Milton appears to reflect this protectionist policy, but that for Burlington appears to have an extremely wide interpretation of agricultural land use. Though neither of the two Burlington E.A.'s which are in the northern area were identified as urban shadow, the Burlington area had, in the recent past, very liberal

severance policies and extensive land fragmentation. This, however, was more associated with the southern area of the City of Burlington.

NIAGARA PENINSULA - SOUTH EASTERN TOWNSHIPS

Studies undertaken by the Regional Municipality of Niagara in the early 1970's divided the Peninsula into a number of rural zones (Regional Municipality of Niagara, 1971, a,b). 'Rural Area No. 4' comprised parts of Thorold, Welland, Pelham, Niagara Falls, Fort Erie and Port Colborne. Seven E.A.'s within this zone have been identified as urban shadow. It is significant, therefore, to note some of the findings concerning this area:

- overall, this will be an area of agricultural decline due to the problems of utilizing poorly drained, heavy textured soils;
- agriculture is characterized by extensive production and limited profitability. Farms are predominantly mixed;
- there are very few full-time farmers;
- on an areal basis contains the largest amount of industry in the Niagara Region;
- non-farm rural development is heavily concentrated around the four urban centres;
- the largest land-use category is 'rural and vacant.' Agriculture is the most widespread land use but the rural land contains large areas that are cleared but not used either for urban or agricultural purposes.

Examination of local municipal plans for the five townships of Thorold, Welland, Niagara Falls, Fort Erie and Port Colborne, would seem to indicate, in all cases, a low to moderate level of protection for agricultural lands; though the policy for the Region of Niagara as a whole is strong regarding farmland preservation and protection of the agriculture industry.

CONCLUSION

Based on additional support material, describing the general areas in which they are located, the identification of the twelve urban shadow E.A.'s is further confirmed.

APPENDIX H - cont'd

PHYSICAL CHARACTERISTICS (ha)

	1961				1981				% CHANGE 1961-1981			
	IMPROVED LAND	UNIMPROVED LAND	CROPLAND	TOTAL AREA	IMPROVED LAND	UNIMPROVED LAND	CROPLAND	TOTAL AREA	IMPROVED LAND	UNIMPROVED LAND	CROPLAND	TOTAL AREA
ONTARIO	4 869 724	2 648 997	3 223 709	7 518 721	4 518 713	1 520 833	3 632 856	6 039 451	- 7.2	-42.6	12.3	-19.7
HALTON	50 628	15 450	33 485	66 078	41 432	10 640	33 151	52 218	-17.9	-31.1	- 0.9	-20.9
PEEL	70 126	14 024	43 817	84 150	47 503	7 890	37 343	55 386	-32.3	-43.7	-14.8	-34.2
HAMILTON-WENTWORTH	63 289	16 898	45 911	80 187	55 464	8 695	48 323	64 153	-12.4	-48.5	5.3	-19.9
- Stoney Creek	7 025	1 103	5 531	8 128	4 139	374	3 695	4 511	-41.1	-66.1	-33.2	-44.5
- Glanbrook	15 648	1 796	11 511	17 444	14 244	804	12 865	15 049	- 8.9	-55.2	11.7	-13.7
- Ancaster	11 292	2 483	8 226	13 775	11 147	1 261	9 968	12 409	- 1.3	-49.2	21.2	-- 9.9
HALDIMAND-NORFOLK	195 508	50 412	131 657	245 921	189 361	36 250	16 143	255 611	- 3.1	-28.1	24.7	- 8.3
- Dunnville	18 885	4 638	12 344	23 523	15 852	3 113	13 203	19 185	-16.0	-32.8	6.9	-18.4
- Haldimand-Nanticoke	103 943	18 889	73 704	122 833	94 480	12 517	84 102	109 997	- 6.2	-33.7	14.1	-10.4
BRANT	67 186	15 555	49 654	82 741	64 988	8 883	58 071	73 870	- 3.3	-42.9	16.9	-10.7
- Onondaga	7 438	978	5 983	8 416	7 680	509	6 833	8 188	3.2	-47.9	14.2	- 2.7
NIAGARA	97 084	20 910	71 587	117 994	89 013	11 631	74 816	100 630	- 8.3	-44.4	4.5	-14.7
- Lincoln	14 069	2 369	11 806	16 256	11 116	1 754	9 513	12 863	-20.9	-25.9	-19.4	-20.7
- West Lincoln	28 103	5 505	19 870	33 608	26 354	3 959	22 191	30 315	- 6.2	-28.1	11.7	- 9.8
- Wainfleet	11 559	2 604	8 259	14 164	12 605	1 397	10 731	14 000	9.0	-46.3	29.9	- 1.2
- Pelham	n.a.	n.a.	n.a.	n.a.	5 997	941	5 129	6 935	n.a.	n.a.	n.a.	n.a.
- Thorold	n.a.	n.a.	n.a.	n.a.	3 115	217	2 840	3 332	n.a.	n.a.	n.a.	n.a.
- Welland	n.a.	n.a.	n.a.	n.a.	1 567	149	1 299	1 716	n.a.	n.a.	n.a.	n.a.
- Port Colbourne	n.a.	n.a.	n.a.	n.a.	4 320	682	3 437	5 001	n.a.	n.a.	n.a.	n.a.
- Fort Erie	n.a.	n.a.	n.a.	n.a.	4 339	696	3 263	5 094	n.a.	n.a.	n.a.	n.a.
- Niagara Falls	n.a.	n.a.	n.a.	n.a.	5 631	635	4 690	6 266	n.a.	n.a.	n.a.	n.a.

APPENDIX H - cont'd

TYPE OF OPERATION (1) LIVESTOCK
(NO. OF FARMS)

	1961			1981			% CHANGE 1961-81		
	DAIRY	CATTLE SHEEP/HOGS	POULTRY	DAIRY	CATTLE SHEEP/HOGS	POULTRY	DAIRY	CATTLE ETC.	POULTRY
ONTARIO	24 246	37 154	3727	12 841	24 551	1886	-51.1	-33.9	-49.4
HALTON	328	300	97	86	177	42	-73.8	-41.0	-56.7
PEEL	397	477	60	157	219	25	-60.4	-54.1	-58.3
HAMILTON-WENTWORTH	446	397	143	165	264	86	-63.0	-57.1	-39.8
- Stoney Creek	31	19	11	5	13	3	-83.9	-31.6	-72.7
- Glanbrook	128	76	18	43	51	13	-66.4	-32.9	-27.8
- Ancaster	93	72	30	33	40	14	-64.5	-44.4	-53.3
HALDIMAND-NORFOLK	947	675	207	315	438	89	-66.7	-35.1	-57.0
- Dunnville	124	102	30	48	53	10	-61.3	-48.0	-66.7
- Haldimand-Nanticoke	742	484	137	247	330	48	-66.7	-46.7	-64.9
BRANT	408	333	64	146	201	25	-64.2	-39.6	-60.9
-Onondaga	44	55	4	26	20	3	-40.9	-63.6	-25.0
NIAGARA	640	341	210	264	308	199	-58.7	- 9.7	- 5.2
- Lincoln	43	39	37	13	21	42	-69.8	-46.2	13.5+
- West Lincoln	287	120	43	144	142	70	-49.8	-15.5	62.8+
- Wainfleet	96	46	23	47	45	19	-51.0	- 2.2	-17.4
- Pelham	n.a.	n.a.	n.a.	13	20	9	n.a.	n.a.	n.a.
- Thorold	n.a.	n.a.	n.a.	5	8	5	n.a.	n.a.	n.a.
- Welland	n.a.	n.a.	n.a.	5	1	0	n.a.	n.a.	n.a.
- Port Colbourne	n.a.	n.a.	n.a.	8	19	10	n.a.	n.a.	n.a.
- Fort Erie	n.a.	n.a.	n.a.	10	10	7	n.a.	n.a.	n.a.
- Niagara Falls	n.a.	n.a.	n.a.	11	16	6	n.a.	n.a.	n.a.

APPENDIX H - cont'd

TYPE OF OPERATION (2) CROPS
(NO. OF FARMS)

	1961					1981					% CHANGE 1961-1981				
	(1) WHEAT/S.G.	(2) FRUIT & VEGE.	(3) MISC. SPEC.	(4) MIXED	(5) OTHER FIELD CROPS	WHEAT/ S.G.	FRUIT & VEGE.	MISC. SPEC.	MIXED	OTHER FIELD	(1)	(2)	(3)	(4)	(5)
ONTARIO	4780	5027	1361	6930	4642	14 708	4335	3768	3681	3190	207.7	-13.8	176.9	46.9	-31.3
HALTON	28	136	56	42	9	124	80	153	43	24	342.8	-41.2	173.2	2.4	166.6
PEEL	31	103	86	36	9	104	56	135	38	17	235.5	-45.6	56.9	5.5	88.9
HAMILTON-WENTWORTH	26	333	91	98	30	236	238	176	66	25	807.7	-28.5	93.4	-32.6	-16.7
- Stoney Creek	1	179	27	8	0	12	77	26	7	0	1100.0	-56.9	-3.7	-12.5	- -
- Glanbrook	8	13	3	29	2	67	16	22	6	2	737.5	23.1	633.3	-79.3	0
- Ancaster	3	19	12	21	8	58	28	28	11	3	1833.3	47.4	133.3	-47.6	-62.5
HALDIMAND-NORFOLK	55	266	47	278	1795	794	258	153	179	1 264	1343.0	-3.1	225.5	-35.6	-29.6
- Dunnville	9	27	6	23	0	85	21	22	17	3	844.4	-22.2	266.7	-26.1	- -
- Haldimand-Nanticoke	29	165	32	192	178	448	132	73	112	106	1444.0	-20.0	128.3	-41.7	-40.4
BRANT	29	54	18	77	361	276	67	74	46	217	851.7	24.1	311.1	-40.3	-39.9
- Onondaga	10	2	1	16	0	41	5	9	7	0	310.0	150.0	800.0	-56.3	- -
NIAGARA	19	1540	109	101	12	259	1378	271	93	16	1263.1	-10.5	148.6	- 7.9	33.3
- Lincoln	0	638	31	14	1	19	463	48	7	3	- -	-27.4	54.8	-50.0	200.0
- West Lincoln	8	24	4	18	3	81	36	38	34	6	912.5	50.0	850.0	88.9	100.0
- Wainfleet	6	15	4	18	0	57	18	14	11	2	850.0	20.0	250.0	-38.9	- -
- Pelham	n.a.	n.a.	n.a.	n.a.	n.a.	13	94	29	12	0	n.a.	n.a.	n.a.	n.a.	n.a.
- Thorold	n.a.	n.a.	n.a.	n.a.	n.a.	7	21	5	4	0	n.a.	n.a.	n.a.	n.a.	n.a.
- Welland	n.a.	n.a.	n.a.	n.a.	n.a.	14	0	5	1	1	n.a.	n.a.	n.a.	n.a.	n.a.
- Port Colbourne	n.a.	n.a.	n.a.	n.a.	n.a.	24	7	9	10	0	n.a.	n.a.	n.a.	n.a.	n.a.
- Fort Erie	n.a.	n.a.	n.a.	n.a.	n.a.	16	3	10	3	2	n.a.	n.a.	n.a.	n.a.	n.a.
- Niagara Falls	n.a.	n.a.	n.a.	n.a.	n.a.	16	18	12	2	0	n.a.	n.a.	n.a.	n.a.	n.a.

TOTAL FARM CAPITAL VALUE
(000's $)

	1961	1981	% CHANGE 1961-1981
ONTARIO	3 741 596	31 283 175	736.1
HALTON	68 810	689 440	901.9
PEEL	97 693	944 874	867.2
HAMILTON-WENTWORTH	86 962	559 404	543.3
- Stoney Creek	- -	- -	- -
- Glanbrook	- -	- -	- -
- Ancaster	- -	- -	- -
HALDIMAND-NORFOLK	260 879	1 820 974	598.0
- Dunnville	- -	- -	- -
- Haldimand-Nanticoke	- -	- -	- -
BRANT	84 261	612 335	627.7
- Onondaga	- -	- -	- -
NIAGARA	156 964	1 007 346	541.8
- Lincoln	- -	- -	- -
- West Lincoln	- -	- -	- -
- Wainfleet	- -	- -	- -
- Pelham	- -	- -	- -
- Thorold	- -	- -	- -
- Welland	- -	- -	- -
- Port Colbourne	- -	- -	- -
- Fort Erie	- -	- -	- -
- Niagara Falls	- -	- -	- -

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ANALYSIS OF OFFICIAL PLANS - CANDIDATE AREA MUNICIPALITIES

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
HALTON REGIONAL PLAN	Defined to include hamlets.	- Farmlands within Rural Area - protected for long-term use. - Farmlands within Urban Area - protected as interim use. - settlement - in hamlets and rural clusters - to avoid prime agricultural lands.	"develop and maintain a permanently secure economically viable agricultural industry" - to preserve prime agricultural lands as a natural resource. - farmlands (term used) priority for protection: 1. soil capability (prime soils) 2. viability of farm size 3. farm type (commercial have high priority	objectives include: - reduction of fragmentation - promotion of leasing of land - preservation of farm community severances: strict policy - farm related/farm dwellings/consolidation/ retiree.	Regional Plan to be used by 4 area municipalities in preparation of their own plans - must conform to Regional Plan. Agricultural Code of Practice applied to protect farming.	High level of Protection for Farmland
BURLINGTON	(not defined)	rural residential definition - min. lot size 7 acres + permits range of uses other than residential	"to encourage orderly preservation of agricultural lands." very wide interpretation of agricultural land use.	- min. lot size 50 acres - bona fide farmer with lot over 100 acres allowed 2 dwelling units.	Agricultural Code of Practice applied to protect residential development.	Low level of Protection for Agricultural Land
MILTON	predominant use of rural lands for agriculture, forestry, soil and wildlife conservation. - agriculture is preferred use in rural areas.	- low density residential development permitted. - Estate Residential Development permitted (min. lot .8 ha.). - other residential lots discouraged. - no residential development on prime agricultural soils.	agricultural area - incompatible uses discouraged (no specific reference to land capability class of soils)	non-farm residential development permitted only in hamlets, rural clusters and rural estate residential development. - sub-division of agricultural holdings discouraged. - severances for farm related uses/retirement/consolidation.		High level of Protection for Prime Agricultural Land

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
BRANT COUNTY	NO	OFFICIAL	PLAN	PROVIDED	FOR	ANALYSIS.
BRANTFORD TOWNSHIP	Designation: Rural Area - lands of minimum agricultural capability where classes 5, 6 & 7 predominate (some land class 4) - wider range of land uses permitted:agric., open space, forestry, wildlife conservation-preferred - agric.-principal use, but flexibility in land uses-concern to minimize conflicts. [All Candidate Area in Brantford = Rural]	Estate Residential Development - only in rural areas. - min. ave. lot size 0.6 ha (1.5 acres)	Designation: Prime Agriculture - classes 1-4 soils - agriculture and related activities only - protection of prime agricultural land base and farm community. [No Prime Agric. Lands in Candidate Area*]	- residential development by consent both non-farm and farm discouraged in Prime Land Areas - general principle. - non-farm residential development prohibited in Prime Agric. Land area.	Agric. Code of Practice applied to protect farming in Prime Agric. Lands and in Rural Areas.	High level of Protection for Prime Agricultural Land*
ONONDAGA	Designation: Rural Agricultural II - land classes 5 to 7, and no high capability for specialty crops. [Candidate Area(s) occupy Rural I and Rural II land areas and include village of Middleport.]	- some rural farm and rural non-farm residential development expected but minimal (areas population unlikely to increase greatly) - severances therefore permitted for farm and non-farm residences though agric. has priority land use.	Designation: Rural Agricultural I - prime agric. land, classes 1-4 soils. - preserve and protect good agric. land. - principal land use-agric. and agric. related.	- development on prime agric. land discouraged - farm-related resident development permitted. - agric. severances only. - urban and non-farm related residential development prohibited.	Agric. Code of Practice applied to protect farming on prime agric. lands - intensive livestock operations may be restricted in rural agric. II areas.	High level of Protection for Prime Agricultural Land

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
HAMILTON-WENTWORTH OFFICIAL PLAN	"Rural Policy Areas" - to discourage unnessary division of viable farm operations. - industry and commerce encouraged if agric. related - but not on prime agric. land. - discourage all alternative uses on prime lands. - develop policies and programs to improve econ. viability of farm industry. - restrict severances in areas of high land capability.	"Rural Residential Development" Rural Settlements - listed to which rural development directed. [all listed-outside Candidate Areas] Rural Residential Estate Development to be discouraged on prime agric. lands and flat open sites. Rural Severances section: - least productive lands. - no interference with agriculture or prejudice the operation of viable farm unit. - limited consents from viable farm operation (bona fide farmers-retirement, etc.) - strict and detailed policies.	"Agriculture and Specialty Crop Areas" - defined as classes 1 and 2 C.L.I., and which are generally free from non-farm uses. - to preserve for food production and as basis for rural community and rural way of life. - predominant land use - farming. [All Candidate Areas-prime agricultural land classes 1 and 2 - according to Map No. 1-3. No Candidate Area on Specialty Crop Land.]	non-farm development to be directed to rural settlement areas.	Guidelines for the Region's municipalities - strong emphasis on preserving viable farm operations and prime agric. lands. Agric. Code of Practice applied to protect farming.	High level of Protection for Prime Agricultural Land.
GLANBROOK	"Rural" land designation - predominant land use agriculture & related activities.	- severances in rural area to be related to farming. - non-farm severances other than residential, permitted if related to agric. production. - non-farm residences generally not permitted - severances. - areas of existing residential development to be restricted in expansion. - Estate Residential permitted except on Class 1 & 2 soils - Designated Rural Settlements [none in Candidate Areas.]	[No specific agricultural definition given.]		[According to Land Use Plan - Candidate Areas majority - rural. Some open space and hazard lands, Binbrook village, minor commercial, and regional waste disposal facility.]	Moderate Level of Protection for Agricultural Land.
BINBROOK TOWNSHIP	Rural Area Zoned Uses - Binbrook regarded as primarily a rural township.	Village Residential - Zoned. [Binbrook in Candidate Area]	Agricultural - Zoned - major part of township in agric. use. - other development permitted with approval and on a limited scale.		[According to Land Use Plan - Candidate Area Binbrook - Agricultural.]	

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
ANCASTER	Designated Rural Lands - predominant use=agriculture but does not include intensive agric. operations.* [*Code of Practice in rural areas appears to protect residential development.] - wide range of uses permitted in rural areas (residential, institutional, commercial.) - designation subject to review in anticipation of future housing needs. [Part of Cand. Area may encroach into - urban boundary - rural boundary.]	- discourage scattered residential development. - development directed to selected areas in municipality: 1. Rural Industrial Designated Land - policies re - sand and gravel extraction. 2. Hamlets - development directed towards land with lesser agricultural value.	Designated Agriculture - encourage continuing use of existing farmlands and related agricultural activity. -[no soil classes listed.] [Vast majority Candidate Area = Agriculture]	- keep farmland free of development. - discourage use of farmland for land extensive recreation. Severances - residual land units as a result of severance discouraged. - farm-related severances permitted (detailed policy) and other agriculturally related severances allowed.	Ag. Code of Practice applied on designated Agric. lands to protect farming.	Moderate to High Level of Protection Agric. Lands [no prime land designation]
STONEY CREEK	NO OFFICIAL PLAN PROVIDED.		- Entire Candidate Area = zoned agricultural			-
TOWNSHIP OF SALTFLEET (1969)	Designated Rural. - Dominant land use=agriculture - but broad definition of categories under Rural. - retention of farms encouraged and retention of rural character of Mt. area.	- no subdivision for residential purposes (except Ridge Rd. area) - subdivision permitted for: - agricultural purposes - inter-family sales - other "rural" purposes.	[No agricultural zoning]			Low level of Protection for Agricultural Land (N.B. 1969)

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
HALDIMAND-NORFOLK REGION	- strong concern with control over rural non-farm population growth. - preservation of rural landscape-protect agric. from conflicting land uses. - Rural lands designated on Classes 5-7 soils.	- most rural population growth should occur in hamlets. - minimize population growth in rural areas outside hamlets. - Estate Residential Devel. permitted only in rural designated areas.	- lands designated Agricultural - Classes 1-4 soils. - preservation of good agric. lands and specialty crop areas - avoid conflicts with adjacent non-farm uses. - discourage scattered non-farm development - land-uses permitted broader than agric. and agric. related/ include open space recreation, limited resid. development, resourc and institutional uses.	- Severances permitted for agricultural uses. - non-agricultural severances should be located in hamlets or towns. - residential severances should be farm related-use poorer soils. - detailed severance policy.	[recognition that some non-farm rural/ agric. residential inevitable. -not as strong a policy as in other regions - "should", "discourage", etc. rather than "not permitted".] -Ag. Code of Practice applied to protect farming. -[other municipal Plans state; "Preservation of agric. land base-major objective of the Regional Plan.]	Moderate Protection for Agricultural Lands
HALDIMAND	no rural land designation stated - (recommended in Amendment that a division be made)	- Estate Residential Devel. permitted in rural land areas as identified in Region Plan - Classes 4-7 (except specialty crop areas) min. lot size .4 (1 acre). - hamlets permitted to grow to 400 (or x 2 existing pop.) Blackheath, York, Empire, Unity Side Rd., Sims Locks Rd. in Candidate Areas.	- preservation of agric. land for agric. purposes. - non-agric. uses discouraged whenever possible to be located in hamlets and urban areas. [no soil classification.]	- severances for non-residential agric. related uses. - residential use for farmers, utilize poorar soils.	Ag. Code of Practice guidelines for new intensive livestock adjacent to residential areas. Resident uses not permitted in proximity to existing farm operations.	Moderate Protection for Agricultural Land

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
NANTICOKE	Rural area designation is within broader Agricultural Designation based on soil Classes 4-7.	- location of non-farm devel. in rural areas to to be strictly controlled. - estate residential development (1-10 lots) permitted in Rural area - Classes 4-7 soils (except if poorer soils are used for specialty crops). Min. lot size .4 ha (1 acre) and only if no conflict with adjacent farm operations. - hamlets - max. size permitted 750 or twice present size, whichever-min. (Only Springvale hamlet in Candidate Area.)	- agric. land base to be protected as dominant lifestyle and economic base. -[not stated, but implied classes 1-4 =Agricultural Lands] - all areas outside urban areas and hamlets-designated agricultural/some areas designated 'rural' within agricultural areas. - small scale commercial and industrial permitted/encouraged on poorer soils (Classes 4-7).	- severances for agricultural use only. - other severances to be in hamlets or towns. - severances should use poorer soils on farm.	- Ag. Code of Practice to protect farming residential severances must meet Ag. Code or discouraged.	Moderate to High Level of Protection for Agricultural Land
DUNNVILLE	no rural land designation stated.	- estate residential development only in rural areas as defined by Regional Plan Classes 4-7 soils. - min. lot .4 ha (1 acre). - only on lands that have been out of agricultural production for 3 or more years and can't be reclaimed. - hamlets - low density resident. Oswego Park and Canborough in Candidate Area.	Agricultural Land designation [no stated soil class] - preserve and maintain agric. land base and community - discourage scattered non-farm develop. & minimize conflicts between agric. & other uses. - predominant land use =agricult. & related activities. - farm viability definition important in policy protection - other uses compatible with farming allowed if no adverse effects on viability	- non-resident severances for agric. and related uses. - residential severances only farm-related and on poorer soils.	Ag. Code of Practices Zoning By-law min. distance between livestock operations & residents.	Moderate level of Protection for Agricultural Lands

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
REGIONAL NIAGARA	- some Class 3 land but predominantly Classes 4-7. - predominant use-agric. but some non-farm related development permitted in "rural" areas and "villages".	- limited amount of non-farm develop. in designated villages and hamlets on lands of low agric. capability. - Rural Residential Develop. some non-farm residential develop. permitted in rural areas. Min. lot size .4 ha (1 acre). Villages and Hamlets - low density housing - to be minimal impact on surrounding agric. areas.	- to preserve agric. uses. Agric. Lands - defined as: 1) unique lands (tender fruit and grape). 2) good general agricultural lands (general classes 1 + 2, 3) 1) + 2) preserved for agricultural use including all types of livestock enterprises.	- existing farm properties should not be subdivided into parcels too small to be viable farm units. - small scale agriculture-related industry & commerce permitted if not possible to put in hamlet or village. - non-farm dwellings or development not permitted in 1) + 2) areas. (some minor exceptions) - severances for farm-related reasons-including retirement.	- Municipalities should formulate policies for protection of unique and good general agric. lands consistent with the Region & specify precise location of non-agric. development in rural areas. - Ag. Code of Practice applied to protect farming.	High level of protection for Unique and Good General Agricultural Lands.
WEST LINCOLN	- agric.-dominant land use in township-it also has the highest proportion of wooded land in the Region. - predominant land uses in rural area, agric., forestry, conservation of soil & wildlife. - other uses permitted-small scale commercial & industrial, related to agriculture.	- extensive non-farm resident and commercial development has occurred along major rural roads-but majority in hamlets. - development if possible to be in hamlets & villages-otherwise on low capability soils. - all rural residential uses min. lot size-1 acre.	[no specific agricultural lands definition given-implicit that-same as for Region. good general agricultural land, Classes 1-3 preserved for agric. use. [virtually all Candidate Area-classed as good general agricultural land.]	- non-farm residential development not permitted on good general agricultural lands (except on low capability soils). - consents for non-farm purposes not permitted on Class 1 & 2 soils except for bona fide farmers (retirement, consolidation, etc.)	- Ag. Code of Practice buffer zones around residential areas. - amendment to Official Plan allows retirement lots on farms without re-zoning process.	High level of protection for Good General Agricultural Lands

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
LINCOLN	General Rural Area - to prevent urban development in rural areas. - to limit non-farm development - predominant land uses-agriculture, forestry, soil & wildlife conservation & other agricultural related uses and some restricted residential.	Village residential designation. Estate residential: - min. lot size-2 acres. - not permitted on Class 1 and 2 soils. - generally not encouraged on Classes 3 and 4 soils except if site unsuited for agriculture.	[No information given - Agricultural Lands.] [No Agricultural Lands Map.]	- pertaining only to Designation on Land Use		Moderate to high level protection Classes 1 + 2 soils/lands.
PORT COLBORNE	Rural: - only minor additional allowances re - land use compared with agricultural lands.*	-*new non-farm residences and non-agricultural uses permitted. - estate and residential subdivision in rural area would require amendment to Official Plan. (less well-defined differences between Rural and Agricultural lands.)	Agricultural Lands Category. - includes much of high capability agricultural lands or woodlands. - predominant use - agriculture/forest. - preservation of farmland important. - other uses permitted on agric. lands similar to rural areas.	- residential buildings allowed on vacant lots not suitable for commercial agriculture. - severances: additional farm buildings permitted without land severance. - no support for severances that would leave non-viable farm units. - severances permitted for retiring farmers and other farm related uses.		Low to moderate protection for Agricultural lands.

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
WELLAND	Rural Area: - to be maintained and development restricted to a minimum. - main use = agriculture and forestry. [very broad and liberal Rural category.]	- large holdings for rural residential units (min. lot size for new division = 25 acres). - single family residences on lots of 3 or more acres.	No specific Agricultural Category Described.		- restrictions placed on expansion of intensive livestock operations. Ag. Code of Practice applied to protect urban/residential uses.	Low level of of Protection for Agricultural Lands.
FORT ERIE	Rural Area: agriculture, forestry, conservation of soil and wildlife and related. - policy to prevent urban development in 'rural' areas.	- new intensive agriculture restricted in location. - restricted non-farm rural residences. Neighbourhood Resident Village Community Estate Residential (dwellings on lots not less than 2 acres). (Candidate Area - predominantly rural - some open space land and planned village community. Stephensville area more intensive residential/commercial (Snyder) industrial uses.)	No Specific Agricultural Category Described. (Noted in Appendix: the "Region's Agricultural Consent Policies" practically eliminate the possibility of creating a residential lot in the agricultural areas of Fort Erie.)		- new intensive livestock restricted to protect urban/residential uses.	Low to moderate level of Protection for Agricultural Lands.
PELHAM	General Rural Area: - areas of poorer soils with limited agric. capability (poorer class 3, classes 4-7). - limited non-farm development may be appropriate.	- farm-related commercial uses that cannot be put in hamlets, etc. - non-farm residential uses (min. lot size .4 ha. 1 acre) Village Residential Areas [none in Cand. Areas]	Agricultural Lands: adopt Regional Definition - 1) Unique lands [none of Candidate Areas] 2) Good General Agriculture classes 1, 2 and most of 3 [most of Candidate areas] - land uses=agriculture and agric.-related, residential uses=agriculture.	- severances=farm related bona fide farmers-retirement, etc.	Re-Airport-no new dwellings permitted in Noise Exposure Forecast contours designated. Height and accoustic restrictions on new dwellings on lots already created. Ag. Code of Practice to Protect Farming	High level of Protection for Good General Agricultural Lands
			Candidate Area - in South - predominantly Good General Agricultural land. - industrial zone along Webber Road. - flood and hazard land along Welland River. - one sizable open space.			

REGION, COUNTY, TOWNSHIP	RURAL AREA		AGRICULTURAL AREA		COMMENTS	
	DEFINITION	DEVELOPMENT POLICIES	DEFINITION	DEVELOPMENT POLICIES SEVERANCES - CONSENTS		CLASSIFICATION RE: AGRICULTURAL PROTECTION
THOROLD	Rural Area - non-urban uses that are non-agricultural should locate in rural areas. - wider range of land uses agricultural and non-agricultural relatod.	- estate residential development permitted - large rural lot - min. size (.4 ha)	Agricultural Areas - primarily agriculture and related uses. - adopts definition used for Region - mapping not yet complete (1983). [None of Candidate Area within this category.]	severances: agriculture-related max. lot = .4 ha. farm fragmentation resulting in non-viable size not permitted.		Moderate to high protection for agricultural lands
WAINFLEET	not expected to have significant increase in population. Rural Area - predominant land uses, agriculture, forestry, soil & wildlife conservation and related agricultural activities.	- anticipate continuing demand for non-farm residential and estate residential development in rural area. - non-farm uses permitted on lower capability lands. - Village Residential - Wainfleet within Candidate Area. (Candidate Area within Rural Lands designation - Good General Agriculture not shown on L.U. map.)	Good General Agric. Areas Classes 1 & 2 land capability preserved for agricultural use.	Severances and Consents - for farm enlargement and amalgamation and residences/retiring farmer.		High level of protection for Classes 1 and 2 soils.
NIAGARA FALLS - Willoughby	Rural Area: - good agricultural land should be preserved - scattered isolated residential development prevented and ribbon development prevented. - township population "rural-non-farm in character" - "rural designation"-primarily agricultural but non-farm dwellings will be allowed on limited scale.	- non-rural uses allowed, encouraged to be compact. - farms & farm residences protected against harmful non-farm uses. - Village Residential designation (density=12 dwellings per ha) Black Creek Village; Lyons Creek Village; Snyder Village	Agriculture - predominant use of land for farming and forestry and related activities. - policy, to retain farms in large units	- good agricultural land should be preserved.	- no firm policies vis a vis agricultural land areas. - Ag. Code of Practice to protect farm uses.	Low to moderate protection for Agricultural Land.
- Welland Township Crowland			Designation Agricultural (Rural) - majority of township = agricultural land use. - zoning by-law in effect covering entire township.			

APPENDIX I

DEFINITIONS

Enumeration Area - a spatial unit defined according to the following criteria:

(1) Population - the number of households in an enumeration area between 375 households in large urban areas to a minimum of 125 in rural areas.

(2) An enumeration area never cuts across any geographic area recognized by the census.

Enumeration areas are normally the smallest geographic unit in which census data are available.

Census Farm - a farm, ranch or other agricultural holding with sales of agricultural products of $250 or more.

Area Rented - includes land leased on a cash or share-crop basis, or used under a lease arrangement with the government.

Rural Non-Farm Population - all members of each household in a rural enumeration area not residing on a farm. A rural enumeration area has a population of less than 1,000/km^2 and a population density of less than 400/km^2.